COMMONWEALTH OF MASSACHUSETTS

CONTRACT DOCUMENTS

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

- **Mary Dunn Road, Barnstable, MA**
- **Marstons Lane, Barnstable, MA**
- **Bell Road, Bourne, MA**
- **Union Road, Norton, MA**
- **John Scott Blvd, Norton, MA**
- **South Worcester Street, Norton, MA**
- **Woodward Street, Norton, MA**
- **Harvey Street, Taunton, MA**
- **South Crane Avenue, Taunton, MA**
- **Harrison Avenue, Taunton, MA**
- **Somerset Avenue, Taunton, MA**
- **Weir Street, Taunton, MA**
- **Hart Street, Taunton, MA**
- **Elm Street, Foxborough, MA**
- **Chestnut Street, Foxborough, MA**
- **South Street, Medfield, MA**
- **West Street, Medfield, MA**
- **North Main Street, Sherborn, MA**

ISSUED FOR BID

May 2022

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

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FY 2022 AND FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

NOTICE TO BIDDERS

The Massachusetts Department of Transportation Rail and Transit Division (MassDOT or Owner) is seeking Contractors to submit a Bid for the following work to rehabilitate eighteen (18) at-grade railroad crossings surfaces and ten (10) signal upgrades on the Cape Main, Middleboro Subdivision, Framingham Secondary, and Falmouth Line:

- Pre-construction survey and as-built construction plans
- City/Town/State Coordination and Approval of Traffic Management Plans (TMP)
- Environmental Permitting Requirements
- Selective brush clearing and tree cutting
- Demolition and excavation of existing at-grade crossing track, roadway and associated materials
- Demolition, excavation and proper disposal of existing grade crossing signal equipment
- Demolition of asphalt and concrete sidewalk approaches
- Disposal of removed crossties, timbers and road crossing wood timbers
- Disposal of existing roadway materials; concrete, steel, rubber, asphalt, etc.
- Disposal and/or salvage of removed track material; timbers, rails, joint bars, plates, OTM
- Asphalt saw cutting and asphalt milling of existing pavement
- Full depth track construction
- Wasting of excavated material along the Right-of-Way (RoW)
- Furnishing, installing, testing and placing into service wayside equipment for Automatic Highway Crossing Warning (AHCW) System at listed grade crossings including required power upgrades.
- Furnishing and installation of new crossing crossties (7”x9”x8’-6”), (7”x9”x 9’)
- Furnishing and installation of signal conduit
- Furnishing and installation of stone track ballast
- Furnishing and construction of full depth track section
- Surfacing, lining and tamping track through the grade crossings and approaches
- Furnishing and installation of rubber rail seal/asphalt crossings
- Furnishing and installation of Hot Mix Asphalt (HMA) pavement roadway and sidewalk surfaces
- Furnishing and installation of HMA sidewalks, curbing and ADA Detectable Warning Panels
- Drainage, ditching and cleaning & flushing of railroad drainage ditch pipe
- Restoration of Railroad Right-of-Way and any disturbed adjacent areas associated with the construction
- Removal and disposal of trash and debris
- Cleanup of the work area
- All other work associated with the Cape Main, Middleboro Subdivision, Framingham Secondary, and Falmouth Line At-Grade Crossing Surface Rehabilitation and Signal Upgrade Project

described in the Project Description and Scope of Work sections of the bid documents and shown on Contract Plans.

Bid Submission

Bids for the Cape Main, Middleboro Subdivision, Framingham Secondary, and Falmouth Line At-Grade Crossing Surface Rehabilitation and Signal Upgrade Project must be submitted to Mass Coastal Railroad (MCRR) by **2:00 pm EDT on Thursday, May 26, 2022**. Bids should be sent to MCRR, 12 Harding St. Unit 202, Lakeville, MA 02347, to the attention of Rob Finley.

Bid Documents

Bid documents will be available from MCRR on **Wednesday, May 11, 2022**. Contact Rob Finley at rcfinley@verizon.net .

Bid Questions

Contractor questions concerning the Bid Package are due by **2:00 pm EDT on Friday, May 20, 2022**. Any questions received after this time will not be considered for review. Submit questions to Rob Finley at rcfinley@verizon.net .

It is requested that Contractor questions also be sent via email to: peter.cruz@Jacobs.com . Responses to questions will be provided by **4:00 pm EDT on Tuesday, May 24, 2022**.

Bids will be considered, and the contract awarded in accordance with statutes governing such contracts under Massachusetts General Law Chapter 30 § 39M.

All bids shall be accompanied by a bid bond payable to the MassDOT Rail and Transit Division in the amount of 5% of the bid.

This project is subject to the schedule of prevailing wage rates as determined by the Commissioner of the Massachusetts Department of Labor and Workforce Development, and the Division of Occupational Safety.

This project has a MBE/WBE participation goal of **6%** for the work performed under this Contract.

All Contractors and Subcontractors working on the Railroad Right-of-Way (RoW) must have an approved Drug and Alcohol testing plan in compliance with all statutes and regulations administered by the Federal Railroad Administration (FRA) in implementing the required 49 CFR Part 219 Drug and Alcohol Program. Contractors are required to submit their approved Drug and Alcohol Testing Program along with their bids.

Bidders must be prequalified by the MBTA in Class 1 – General Transit Construction and/or Class 3 – Trackwork and Class 6A2 – Railroad Signals and Communications for a $7.2 million contract value. Bidders not prequalified are not eligible to bid.

Bidders must provide a list of projects of similar size and scope and references for three of those projects as identified in the Bid Form section of the Contract Documents. Any subcontractors used on this project are to be submitted to MassDOT for approval.

Pre-Bid Meeting

The Pre-Bid Meeting will be at the Mass Coastal RR offices at **12 Harding St., Unit 202, Lakeville, MA 02347 on Tuesday, May 17, 2022, at 10:00 am** with an on-site inspection of a representative crossing immediately following meeting.

Attendance at the pre-bid meeting is mandatory for all prospective bidders. All attendees accessing Railroad RoW must have the proper Personal Protection Equipment (PPE) required by MCRR including reflective vest, hardhat, safety glasses and safety toed boots.

Successful Bidder will be the lowest responsible and eligible bidder as determined by MassDOT based on ability to complete the entire Cape Main, Middleboro Subdivision, Framingham Secondary, Falmouth Line At-Grade Crossing Surface Rehabilitation Project by **Friday, December 16, 2022,** as described in the Project Description and Scope of Work sections of the bid documents.

The successful bidder, as a condition of contract award, will be required to certify that it is in full compliance with the Commonwealth's COVID-19 Guidelines, and with all COVID-19 guidelines and requirements issued by the CDC and OSHA, and that it has or will make all appropriate updates and revisions to its company-wide Health and Safety Plan to properly address such guidelines and requirements.

The Commonwealth's most recent COVID-19 guidelines and documents can be found on the main page of the MassDOT website and can be found here:

https://www.mass.gov/covid-19-guidelines-and-procedures-for-all-construction-sites-and-workers-at-all-public-work

It is Contractor's responsibility to stay current with any changes or addendums issued to these guidelines. All costs associated with compliance with this provision are considered incidental to the contract cost and therefore Contractor will not be entitled to any additional compensation.

MassDOT Rail & Transit Division reserves the right to reject any or all Bids, to delete any Bid Items from the Contract or proceed to do any of the work otherwise, as may be deemed to be in the best interest of MassDOT.

END OF SECTION

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FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

PROJECT DESCRIPTION

The Project work consists of the reconstruction of eighteen (18) at-grade railroad/roadway crossings and ten (10) signal system upgrades on the Cape Main, Middleboro Subdivision, Framingham Secondary, and Falmouth Line. These railroad lines are owned by the Commonwealth of Massachusetts Department of Transportation (MassDOT or Owner). The Cape Main, Middleboro Subdivision, Framingham Secondary, and Falmouth lines are operated, inspected and maintained under contract by the Massachusetts Coastal Railroad, LLC (MCRR) in the following Massachusetts towns: Barnstable, Bourne, Norton, Taunton, Foxborough, Medfield, and Sherborn.

The at-grade railroad crossing locations are listed below:

1. *Mary Dunn Road, Barnstable, Massachusetts – Cape Main MP 74.15
2. *Marstons Lane, Barnstable, Massachusetts – Cape Main MP 75.28
3. *Bell Road, Bourne, Massachusetts – Falmouth Line MP 0.40
4. Union Road, Norton, Massachusetts – Middleboro Subdivision MP 2.83
5. John Scott Boulevard, Norton, Massachusetts – Middleboro Subdivision MP 3.38
6. South Worcester Street, Norton, Massachusetts – Middleboro Subdivision MP 4.25
7. Woodward Street, Norton, Massachusetts – Middleboro Subdivision MP 5.87
8. Harvey Street, Taunton, Massachusetts – Middleboro Subdivision MP 7.16
9. South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81
10. Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97
11. Somerset Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 11.10
12. Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25
13. Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17
14. Elm Street, Foxborough, Massachusetts – Framingham Secondary MP 1.89
15. Chestnut Street, Foxborough, Massachusetts – Framingham Secondary MP 3.49
16. South Street, Medfield, Massachusetts – Framingham Secondary MP 11.48
17. West Street, Medfield, Massachusetts – Framingham Secondary MP 13.26
18. North Main Street, Sherborn, Massachusetts – Framingham Secondary MP 17.70

Construction must be substantially completed before Friday, November 18, 2022.

*** Contractor is advised to focus on the construction of the at-grade railroad crossing surfaces located on Cape Main and Falmouth Lines during the fall months of September 2022 through November 2022. Contractor is advised the Cape Flyer Service operates on the Cape Main Fridays, Saturdays and Sundays beginning Memorial Day Weekend and continuing through Labor Day Weekend. Crossing work cannot impact Railroad Operations. Between May 30, 2022 and September 5, 2022, work must be scheduled Monday-Thursday only and at the discretion of MCRR.**

Project work includes, but is not limited to:

- Pre-construction survey and as-built construction plans
- City/Town/State Coordination and Approval of Traffic Management Plans (TMP)
- Environmental Permitting Requirements
- Selective brush clearing and tree cutting
- Demolition and excavation of existing at-grade crossing track, roadway and associated materials
- Demolition, excavation and proper disposal of existing grade crossing signal equipment
- Demolition of asphalt and concrete sidewalk approaches
- Disposal of removed crossties, timbers and road crossing wood timbers
- Disposal of existing roadway materials; concrete, steel, rubber, asphalt, etc.
- Disposal and/or salvage of removed track material; timbers, rails, joint bars, plates, OTM
- Asphalt saw cutting and asphalt milling of existing pavement
- Full depth track construction
- Wasting of excavated material along the Right-of-Way (RoW)
- Furnishing, installing, testing and placing into service wayside equipment for Automatic Highway Crossing Warning (AHCW) System at listed grade crossings including required power upgrades.
- Furnishing and installation of new crossing crossties (7” x 9” x 9’)
- Furnishing and installation of new crossties (7” x 9” x 8’-6”)
- Furnishing and installation of signal conduit
- Furnishing and installation of stone track ballast
- Furnishing and construction of full depth track section
- Surfacing, lining and tamping track through the grade crossings and approaches
- Furnishing and installation of rubber rail seal/asphalt crossings
- Furnishing and installation of Hot Mix Asphalt (HMA) pavement roadway and sidewalk surfaces
- Furnishing and installation of HMA sidewalks, curbing and ADA Detectable Warning Panels
- De-stressing of existing CWR
- Drainage, ditching and cleaning & flushing of railroad drainage ditch pipe
- Restoration of Railroad Right-of-Way and any disturbed adjacent areas associated with the construction
- All signal work associated with crossings
- Removal and disposal of trash and debris
- Cleanup of the work area
- All other work associated with the Cape Main, Middleboro Subdivision, Framingham Secondary, and Falmouth lines At-Grade Crossing Surface Rehabilitation And
- Signal Upgrade Project described in the Project Description and Scope of Work sections of the bid documents and shown on Contract Plans.

Contractor shall submit a Construction Schedule, Traffic Management Plans and Sequencing Plans to Railroad and Owner for review and approval before commencing work.

END OF SECTION

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Labor Participation goals for this Project shall be 15.3% for minorities and 6.9% for each job category. The goals are applicable to both Contractor's and SubContractor's on-site construction workforce. Refer to Document 00820 for details.

SCOPE OF WORK

The Scope of Work to be performed for this Project includes but not limited to the following:

- Pre-construction survey and as-built construction plans
- Coordination with local municipalities for the necessary traffic management to close roads and/or detour vehicular and pedestrian traffic and develop a Traffic Management Plans (TMP) for each crossing for municipalities approval
- Coordination with the operating Railroad for the necessary track outages
- Existing utility identification and coordination efforts
- Land owner coordination and outreach
- Selective brush clearing and tree cutting
- Demolition, disposal, and excavation of existing at-grade crossing track, roadway, and associated materials
- Demolition, excavation, and proper disposal of existing grade crossing signal equipment
- Furnishing and installation of signal conduit
- Furnishing, installing, testing, and placing into service wayside and control equipment for Automatic Highway Crossing Warning (AHCW) System at listed grade crossings including required power upgrades.
- Furnishing and installation of stone track ballast
- Furnishing and construction of at-grade crossing track structure
- Furnishing and construction of full depth track section
- Tamping, lining and surfacing track through the grade crossings and approaches
- Furnishing and installation of pre-cast concrete grade crossing panels
- Furnishing and installation of rubber rail seal/asphalt crossings
- Furnishing and installation of highway guardrail
- Drainage, ditching and culvert pipe repair and replacement
- Furnishing and installation of ductile iron and corrugated metal drainage pipes
- Wasting of excavated material along the Right of Way (ROW)
- Asphalt milling
- Furnishing and installation of Hot Mix Asphalt (HMA) pavement roadway and sidewalk surfaces
- Demolition of concrete and asphalt sidewalk approaches
- Furnishing and installation of ADA compliant sidewalk approaches
- Furnishing and installation of HMA sidewalks and precast concrete curbing

- Furnishing and installation of ADA detectable warning panels
- Disposal of removed crossties, timbers and road crossing wood timbers
- Disposal of existing roadway materials
- Disposal and/or salvage of removed track materials
- Restoration of Railroad Right-of-Way and any disturbed adjacent areas associated with the construction
- Removal and disposal of trash and debris and cleanup of the work area.

This list has been compiled to provide Contractor with an order of magnitude work scope and to attempt to describe the complexity of the work required. Contractor is advised that it is the sole responsibility of Contractor to perform all the work in conformance with the Contract Documents and to satisfactorily complete the work on time and to the standards of MassDOT Rail and Transit Division (MassDOT or Owner) and Massachusetts Coastal Railroad (MCRR or Railroad).

The eighteen (18) at-grade railroad crossing locations are listed below:

Cape Main:

- **Mary Dunn Road, Barnstable, Massachusetts – Cape Main MP 74.15
- **Marstons Lane, Barnstable, Massachusetts – Cape Main MP 75.28

Middleboro Subdivision:

- *Union Road, Norton, Massachusetts – Middleboro Subdivision MP 2.83
- *John Scott Boulevard, Norton, Massachusetts – Middleboro Subdivision MP 3.38
- *South Worcester Street, Norton, Massachusetts – Middleboro Subdivision MP 4.25
- *Woodward Street, Norton, Massachusetts – Middleboro Subdivision MP 5.87
- *Harvey Street, Taunton, Massachusetts – Middleboro Subdivision MP 7.16
- *South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81
- *Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97
- *Somerset Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 11.10
- *Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25
- *Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17

Framingham Secondary:

- *Elm Street, Foxborough, Massachusetts – Framingham Secondary MP 1.89
- *Chestnut Street, Foxborough, Massachusetts – Framingham Secondary MP 3.49
- *South Street, Medfield, Massachusetts – Framingham Secondary MP 11.48
- *West Street, Medfield, Massachusetts – Framingham Secondary MP 13.26
- *North Main Street, Sherbon, Massachusetts – Framingham Secondary MP 17.70

Falmouth Line:

- **Bell Road, Bourne, Massachusetts – Falmouth Line MP 0.40

Construction must be substantially completed before Friday, November 18, 2022.

*** Contractor is advised to focus on the construction of the at-grade railroad crossing surfaces located on the Middleboro Subdivision and Framingham Secondary during the summer months of June 2022 through August 2022.**

**** Contractor is advised to focus on the construction of the at-grade railroad crossing surfaces located on Cape Main and Falmouth Line during the fall months of September 2022 through November 2022. Contractor is advised the Cape Flyer Service operates on the Cape Main Fridays, Saturdays and Sundays beginning Memorial Day Weekend and continuing through Labor Day Weekend. Crossing work cannot impact Railroad Operations. Between May 30, 2022 and September 5, 2022, work must be scheduled Monday-Thursday only and at the discretion of MCRR.**

1. Pre-construction Coordination, Permitting and Engineering

A. Contractor shall develop and submit a traffic management plan to the State, Town and/or Municipal Authority(s) Having Jurisdiction (AHJ), and MassDOT for review and approval for each at-grade crossing location. Contractor shall be responsible for all aspects of Traffic Management including police and/or fire details and requirements.

B. Contractor is advised that they will be required to work concurrently with their Signal Contractor. The Signal Contractor will be installing and upgrading the roadway crossing signal system at the following crossing locations:

1. Marstons Lane, Barnstable, Massachusetts – Cape Main MP 75.28
2. Union Road, Norton, Massachusetts – Middleboro Subdivision MP 2.83
3. John Scott Boulevard, Norton, Massachusetts – Middleboro Subdivision MP 3.38
4. South Worcester Street, Norton, Massachusetts – Middleboro Subdivision MP 4.25
5. Harvey Street, Taunton, Massachusetts – Middleboro Subdivision MP 7.16
6. South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81
7. Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97
8. Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25
9. Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17
10. Chestnut Street, Foxborough, Massachusetts – Framingham Secondary MP 3.49

The Signal Contractor shall utilize the Grade Crossing Contractors railroad and traffic shutdowns to complete their work in conjunction with Grade Crossing Contractor. Coordination and open communication between the two contractors and their subs are critical to the success of this Contract.

C. Contractor shall contact the Town Engineer, Board of Selectmen, Town Administrators, Highway, Police and Fire Departments to provide as much advanced notice as possible of any at-grade railroad crossing closure. Contractor shall notify the public at least two (2) weeks in advance through local newspaper and variable message signs posted on both sides of the crossing, or as directed by the local Authorities Having Jurisdiction (AHJ).

D. Contractor shall coordinate with the State, Town and/or Municipal Authority(s) Having Jurisdiction (AHJ) for each crossing and secure all necessary road permits, police details, traffic signage, etc. necessary for the At-Grade Railroad Crossing Surface Rehabilitation Project work. Contractor shall submit to MassDOT confirmation and evidence of notification and required permits for each at-grade crossing.

E. Contractor shall pre-mark each at-grade crossing excavation limits. Contract shall contact and coordinate with Dig Safe to mark existing utilities within the limits of work. Contractor shall submit confirmation and evidence of Dig Safe notification and ticket number for each at-grade crossing to MassDOT for approval before any excavation work takes place.

F. Contractor is responsible for locating, protecting and preserving all existing utilities, conduits, cabling, crossing signals and structures, known and unknown, within the at-grade crossing construction work limits.

G. Contractor is responsible for coordination with the Railroad and utility owner(s) of any utility encountered prior to, or during, construction.

H. Contractor is responsible for coordination with the operating Railroad(s) for the protection of any railroad crossing signal systems and proper pre-construction train traffic signaling requirements.

I. Contractor shall submit pre-construction survey plans for review and approval to MassDOT for each at-grade crossing location. The plans are to include, at a minimum, existing: rail joint or weld locations; track line and grade; road grades; drainage; signaling equipment; street markings; sidewalks; and all other pertinent information.

J. Contractor shall submit post-construction, hard copy and CAD, as-built plans to MassDOT for each at-grade crossing location upon completion of the project. The as-built plans are to include, at a minimum, final: rail joint or weld locations; track line and grade; road grades; drainage location and means; conduit size and locations; signaling equipment and conduits; street markings; signage; sidewalks; and all other pertinent information.

K. Contractor is responsible to abide by any, and all, permitting conditions and/or requirements stipulated by any Order of Conditions issued by local Conservation Commissions or any other State or Federal protection agency(ies).

L. Prior to the start of work, Contractor shall furnish and install all erosion and sedimentation control devices in accordance with the Contract Plans, Scope of Work, Technical Specifications, Special Conditions and all Local, Federal and State DEP Regulations per the Environmental Permit requirements.

M. All modifications to grade crossing warning layouts or devises shall be approved by Mass DPU prior to construction.

N. All material supplied by MassDOT and/or Contractor required for the completion of this Project is described in the Special Conditions section of the bid documents.

O. All Work performed in this section shall be in accordance with this Scope of Work, Contract Plans, Technical Specifications, Special Conditions and all State and local requirements.

2. Demolition, Excavation, Removal and Disposal of Existing Track and Roadway Structure

A. Selective clearing and grubbing and trash removal work shall consist of clear, grub, and dispose of selective vegetation, bushes, brush, trees, stumps, fallen timber logs, roots, overhanging branches, trash, concrete debris and any other materials within the limit of work. The selective vegetation and trees will be flagged by the engineer prior to work starting. Clearing and grubbing work shall occur at each quadrant of the crossing, up to twenty-five feet (25’) from the nearest track center-line and for a distance of up to seventy-five track feet (75’) TF from the nearest road crossing edge.

B. Contractor shall break rail at existing joints in the track at four (4) points, two (2) points on either side of the crossing, for each track in preparation for crossing demolition. If it is determined by MassDOT/MCRR that the nearest joint is beyond a reasonable distance from the crossing, Contractor shall cut the rail at the Railroad’s direction and drill rail for new joint locations or prepare rail for thermite welds as directed in the Technical Specifications. The joints to be broken, and/or any new joint or weld locations, will be determined in the field by MassDOT/MCRR personnel. Contractor shall adhere to all required procedures for cutting rail in CWR per MassDOT MW-1 when making joints in CWR territory.

C. Contractor shall saw cut the full-depth roadway pavement as shown on the Contract Plans or per MassDOT Typical Grade Crossing Plans and saw cut the partial depth of roadway pavement (approximately 2”) to the scarifying limits as shown on the Contract Plans.

D. Contractor shall remove all existing pavement from within full depth excavated track “box” as shown on the Contract Plans or as designated by MassDOT/MCRR. Existing asphalt pavement outside the track “box” to the crossing reconstruction limits shall be milled two inches (2”) deep or if in a deteriorated state, removed at the direction of MassDOT/MCRR.

E. Contractor shall excavate full depth trackbed “box” to the dimensions specified per the Contract Plans or as directed by MassDOT/MCRR.

F. Contractor shall load, remove and dispose of all excavated wood materials. Defective wood material is to be taken to a disposal site specifically licensed, by the state in which the facility is located, for the processing of creosote treated railroad crossties and be disposed of in accordance with EPA requirements and in accordance with the Technical Specification, Special Conditions and other Project documents. Crossties deemed reusable by MassDOT/MCRR shall not be used in the reconstruction of the at-grade crossings. Contractor shall neatly stack, bundle and strap the reusable crossties and deliver them to a MassDOT storage facility within a one-hundred (100) mile radius of the crossing as directed by MassDOT.

G. Contractor shall load, remove and dispose of all excavated asphalt, concrete and rubber material. All excavated asphalt, concrete and rubber material shall be disposed of in accordance with State, local and Mass DEP requirements.

H. Contractor shall load, deliver and unload all salvaged rail and OTM. Salvaged rail is to be delivered to a MassDOT storage facility located within a one-hundred (100) mile radius of the crossing. The salvaged rail is to be neatly stockpiled together at the storage facility as directed by MassDOT.

I. All rail, metal material and metal OTM designated by MassDOT/MCRR as scrap is to be picked up, transported to, and loaded into scrap dumpsters within a one-hundred (100) mile radius of the crossing for disposal by Railroad.

J. Contractor shall waste all excavated soil and ballast material. All excavated soil and ballast material shall be loaded, transported, dumped and graded along railroad Right-of-Way (ROW), at the direction of MassDOT/MCRR, within five (5) track miles of the excavation point. Wasting / grading of material shall not foul drainage ditches nor finish above top of tie elevation. At no time should the excavated soil and/or ballast material leave railroad ROW envelope by any means. Excavated soil and ballast material is not to be re-used within the excavated trackbed "box" as described above.

K. Contractor shall provide sufficient steel roadway plating, blocking and any necessary material to safely plate the crossing under construction at any time during the construction or roadway outage. The plating must be designed to handle current car and truck traffic loads and fire/police equipment.

L. All Work performed in this section shall be in accordance with this Scope of Work, the Contract Plans, Technical Specifications, and Special Conditions and AREMA practices.

3. Typical New At-Grade Railroad Crossing Construction

A. Contractor shall thoroughly compact the excavated subgrade "box" area defined in the Scope of Work and Contract Plans per the Technical Specifications before installation of any new ballast section.

B. Contractor shall install four (4) four inch (4") Schedule 80 PVC conduit parallel with the track, (two (2) on each side) and four (4) four inch (4") galvanized rigid steel (GRS) conduit perpendicular to the track (two (2) at each end) at each at-grade crossing location for Railroad Crossing Signaling use per the Contract Plans and Technical Specifications, or as directed by MassDOT/MCRR. GRS conduit crossing shall be located ten (10) feet off of the crossing surface edge and the PVC conduit shall extend from the GRS end to GRS end or as directed by MassDOT/MCRR field personnel. Contractor shall submit proposed end of conduit location finders, i.e. stakes, ribbons, etc., for review and approval. Contractor shall mark ends of the conduit with approved marking devices.

C. Contractor is advised that certain crossings are within CWR territory. Contractor shall de-stress track at these crossings for 500 TF from the edge of the crossing surface in either direction as part of each at-grade crossing lump sum. Any additional de-stressing that is needed beyond the 500 TF will be covered under a separate pay item.

D. Contractor shall furnish, install, and thoroughly compact a minimum 4" layer of new subballast throughout the excavated area in preparation for the ballast installation per the Contract Plans and Specifications.

E. Contractor shall furnish new, AREMA #4 ballast and place it throughout the excavated area and thoroughly compact in four inch (4") maximum lifts until ballast grade is at the finished bottom of crosstie grade in preparation for the crosstie-installation per the Contract Plans and Specifications.

F. Contractor shall construct new crossing track sections with new: 115RE, 136RE rail, or as directed by MassDOT/MCRR; 7"x 9"x 9' (Rail Seal) wood crossties; double shoulder tie plates; cut spikes; compromise joints and/or welds; and transition crossties if required, on the prepared and compacted ballast trackbed "box" per the Contract Plans and Technical Specifications.

G. For each crossing track located on the Middleboro Subdivision and Framingham Secondary, Contractor shall perform spot replacement of up to twenty (20) new 8'-6" crossties and OTM beyond the limits of the full depth track construction "box" or as directed by MassDOT/MCRR field personnel.

1. Woodward Street on the Middleboro Subdivision at MP 5.87, In additional to twenty (20) spot tie replacement the Contractor will replace all ties within the first 20 ft. of each approach as shown on the Contract Plans.

H. For each crossing track on the Cape Main and Falmouth Line, Contractor shall perform spot replacement of up to twenty (20) new 8’-6” crossties and OTM beyond the limits of the full depth track construction “box” (Up to twenty crossties for two track crossings) as directed by MassDOT/MCRR field personnel.

I. Track beyond the limits of the crossing surface shall be cut spike and double shoulder tie plate track construction on 7”x 9”x 8’-6” crossties, spaced at 19.5” unless otherwise noted on the Contract Plans or as directed by MassDOT/MCRR field personnel.

J. Contractor is responsible for cutting in and installing all necessary joints, compromise joints, and/or welds with the proper stagger. Joint locations shall be determined in the field by Contractor based on new rail end locations and existing rail joints. All joint locations are to be field verified and approved by MassDOT/MCRR before the rail is cut and new joints are installed.

K. Contractor shall flood the completed track with AREMA #4 ballast.

L. Contractor shall surface, line and tamp (SLT) track to the optimal alignment and elevations as determined by MassDOT/MCRR field personnel. A minimum of three (3) tamping passes is required. Contractor shall surface, line and tamp all track within the full depth construction limits **plus one-hundred and fifty feet (150’) in each track direction** of the excavation limits or as directed by MassDOT/MCRR field personnel.

1. Additional tamping passes may be required for ballast compaction and track stability to the complete satisfaction and approval of MassDOT/MCRR. All SLT and associated work shall be considered incidental to the construction of the at-grade crossing.
2. Contractor shall replace all broken or failed plates and spikes required to secure rail to the existing crossties as well as replace any defective ties in order to surface, line and tamp the crossing approaches as required to meet Technical Specification GENERAL TRACK CONSTRUCTION tolerances.

M. Sweep/regulate crossing area in preparation for the installation of pre-cast concrete crossing panels or rubber rail seal installation.

N. Contractor shall ensure new at-grade roadway and track water runoff and drainage are properly directed to existing drainage ditches and catch basins as intended and to the satisfaction of the MassDOT/MCRR field personnel.

O. Contractor shall re-paint any existing pavement markings as shown on the Contract Plans as well as replace and repair all pavement markings disturbed or removed as part of the at-grade crossing work.

P. **Typical Crossing Materials**

1. Typical Rubber Rail Seal Crossings:

A. Contractor shall construct rubber rail seal crossing system on the new track section with new 115RE or 136RE rails as shown on the Rubber Rail Seal Grade Crossing Detail plan and per the Technical Specifications or as directed by MassDOT/MCRR.

B. For crossings listed on the Rubber Rail Seal Double Shoulder Plate Grade Crossing Detail plan, Contractor shall install 115RE rail on 7”x 9”x 9’ wood crossties for the rubber rail seal installation. Rail shall be fastened using double shoulder tie plates with four (4) 5/8” track spikes, and two (2) anchors per plate. The 7”x 9”x9’ wood crossties shall be spaced in accordance with rubber rail seal manufacturer specifications and recommendations. (Typically, 18” O.C.)

C. Contractor shall box anchor all crossties within the crossing surface and for 250’ in either direction from the edge of the grade crossing surface.

D. Contractor shall install rubber rail seal on the field and gauge sides of the track through the limits shown on the plans and/or as directed by MassDOT/MCRR. All rubber rail seal manufacturer’s installation instructions and recommendations are to be followed. The crossing rubber rail seal system shall meet all ADA requirements when used at all potential pedestrian crossing locations.

Q. Contractor shall install seven and one-half inches (7 ½”) or eight and one-half inches (8 ½”) of Hot Mix Asphalt (HMA) Pavement for at-grade crossings at the proposed roadway elevations, grade and edge lines to the field side concrete panels or rubber rail seal. Between the ends of pre-cast concrete grade crossing panel, between gauge side rubber rail seal and the full-depth sawcut line of the existing pavement, minimum HMA thickness various from 7 ½” to 8 ½” (5-1/2” or 6-1/2” base and 2” top) based on what rail section is being used at the crossing. Install 2” thick top coat minimum HMA between full-depth sawcut line and limit of milled surface, smooth and flush with existing roadway surface. Contractor shall install asphalt beyond the end of the rubber rail seal level for a minimum of one foot (1’) then slope down at a 2:1 to top of tie at the approaches.

R. Contractor is responsible for the construction, grading and installation of swales, ditches, pipes and riprap to re-establish proper drainage and water shedding from the track, roadway and surrounding area. Water shedding will flow away from the tracks, and towards the existing ditches and water shed areas as shown on the plans or as directed by MassDOT field personnel.

S. Within existing Continuously Welded Rail (CWR) territory, Contractor shall destress rail to achieve a neutral rail temperature of 105^{o}F (-5^{o}/+10^{o} F) whenever track is considered disturbed according to the MassDOT MW-1 or current MCRR CWR policy. Contractor shall box anchor all crossties for 200’ in either direction prior to cutting CWR.

1. Contractor is responsible for all aspects of the rail destressing process, including, but not limited to: thermal expansion calculations, rail cutting and removal, marking and recording quarter points and rail temperatures, thermal expansion of rail, installing temporary 6-hole joint bars, installing new rail anchors, installing new rail holding spikes or Pandrol clips and thermite welding of all joints.

2. Contractor shall utilize a railbound vibrating rail heating unit specifically designed for thermal destressing of rail.

3. All work related to the installation of continuously welded rail shall be in accordance with this Scope of Work, Technical Specifications, Special Conditions, MassDOT MW-1 and AREMA Recommended practices.

T. Contractor shall repair or replace in-kind any item removed or damaged as part of the Project work including, but not limited to: signs; curbing; street markings; signals; manholes; utilities; conduit; etc.

U. All Work performed in this section shall be in accordance with this Scope of Work, the Contract Plans, Technical Specifications, and Special Conditions and AREMA practices.

4. Required Track Equipment for the Project

A. To insure production goals are met, Contractor is required to utilize, at a minimum, the following pieces of equipment (with qualified operators) in the installation process:

- 1 Ballast Regulator w/ Broom
- 1 Hi-Rail Grapple Truck
- 1 Production Tamper (Mark IV or approved equivalent)
- 1 Hi-Rail Backhoe/Gradall
- 1 Hi-Rail Dump
- Teleweld Series I Rail Heater
- Vibrator Car

B. In addition, at least one qualified mechanic properly outfitted with fluids, parts and tools shall be on site at all times when in production mode.

5. General Requirements to Signal Improvements

A. The Work to be performed under this Contract consists of providing (designing, furnishing, installing, testing and placing in service) upgrade to Automatic Highway Crossing Warning System (AHCW) at locations specified herein and shown on the Contract Drawings.

B. The upgrade shall include, but not limited to instrument housings, cables and raceways, materials, equipment, wayside and utility power facilities required to provide a complete safe and reliable AHCW system.

C. Where applicable, AHCW system shall interfaced with signal system that controls train movements through the grade crossing.

D. Contract Drawings provided to the Contractor are typical and represent general principles and concepts upon which the Contractor shall base the design of the proposed system and locations of wayside equipment.

E. The Work includes removal of all retired grade crossing warning system equipment, as well as signal facilities presently out-of-service and return to the Railroad unless directed otherwise.

F. The Work includes preparation of the new as-built and record drawings as specified herein.

G. It is the sole responsibility of the Contractor to perform all the Work in conformance with the Contract Documents, to complete the work on time and to the satisfaction of MassDOT Rail and Transit Division (MassDOT or the Owner) and the operating railroad (Massachusetts Coastal Railroad or the Railroad).

H. The Contractor shall provide material, equipment, tools, and labor to upgrade grade crossing facilities in accordance with the requirements of Technical Specifications and Contract Drawings. All material and equipment proposed for installation shall be submitted and approved prior to furnishing in accordance with the requirements of Submittals Section of the Technical Specifications.

I. Where the new train detection equipment is required, the Contractor shall ensure that response time specific for the proposed equipment is included in calculations of warning time and approach distance length.

J. The Contractor shall ensure that calculations of warning time and approach distance length are based on the Maximum Authorized Speed established over the grade crossing territory at the time of placing AHCW in service. The Contractor shall relocate shunts or other approach length limiting facilities if existing approach distances require revision

K. The Contractor shall ensure that new or relocated shunts or other approach length limiting facilities do not affect operation of adjacent crossings.

L. The Contractor shall provide enclosed and secure facilities for storage of materials delivered by his vendors for installation under this Contract in accordance with approved schedule. It is responsibility of the contractor to have all material, labor and equipment ready for performing work during the grade crossing street closure. The Contractor shall be responsible for any loss or damage to the material and equipment stored in these facilities. The Contractor shall remove storage facilities and restore the site to its original conditions after completion of work.

M. The Contractor shall remove and dispose of all retired crossing warning system equipment and other out-of-service facilities, including foundations, in the vicinity of the grade crossing within the Railroad right-of-way, that are not part of the final grade crossing warning system. There shall be no equipment, housings, foundations, structures or other facilities left on site after completion of Work that are not required for operation of the AHCW system, unless otherwise directed by the Engineer.

N. The Contractor shall protect existing track structure from damage and shall avoid track contamination by construction and excavation debris and shall restore track to its original condition by the end of each workday. The Contractor shall restore track structure and the construction site to its original condition whenever it was affected as results of his activities

6. Location Specific At-Grade Railroad Crossing and Signal Upgrade Notes:

Location specific at-grade railroad crossing notes are for reference only. The notes are intended to provide the Contractor with additional information and guidance.

CAPE MAIN CROSSINGS:

A. Mary Dunn Road, Barnstable, Massachusetts – Cape Main MP 74.15

Approximate street address for GPS/Google location ONLY:

1443 Mary Dunn Rd., Barnstable, MA

1. Track and Grade Crossing Surface Work

    A. Signal conduit:

        a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track) within the steel bridge tub section at the direction of MassDOT field personnel.

    B. Crossing Surface:

        a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

    C. Roadway work:

        a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

        b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

    D. Site specific notes:

        a. Contractor is advised of the drainage work to be completed at this crossing.

        b. Contractor shall clear an area of 275’x15’of bamboo along the MassDOT ROW.

        c. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the Town of Barnstable, MA for approval.

2. **Signal Upgrade Work:**

    Furnish for installation by others Constant Warning Time based train detection equipment (Alstom XP-4 predictor) and Shunt Augmenter (Genesis t-Ex).

B. Marstons Lane, Barnstable, Massachusetts – Cape Main MP 75.28

Approximate street address for GPS/Google location ONLY:

35 Marstons Lane, Yarmouth Port, MA

1. Signal Upgrade Work:

    A. Field verify and update existing as-in-service drawings to CAD format.

B. Provide the following:

- Constant Warning Time (CWT) based train detection and crossing control equipment (Alstom XP-4 Predictor) to replace existing motion detector.
- Two (2) battery banks.
- Two (2) battery chargers.
- Power off indication lights on each side of case.
- Tell-tale LED strobe light on top of mast.
- Electronic bell.

C. Replace existing with new:

- Two (2) sets of 2-way 12” LED lights (Cantilevers)
- Four (2) sets of 1-way 12” LED lights.
- Crossbucks (4).
- Gate arms with LED flashers
- Provide track leads and cable to all wayside equipment.
- Replace existing cantilever internal wiring

D. Site specific notes:

a. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the Town of Barnstable, MA for approval.

FALMOUTH LINE CROSSINGS:

A. Bell Road, Bourne, Massachusetts – Falmouth Line MP 0.40

Approximate street address for GPS/Google location ONLY:

13 Bell Road, Bourne, MA

1. **Track and Grade Crossing Surface Work**

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

a. Contractor advised that a 75’x20’ compacted ballast truck pad will be constructed on the south side of the crossing as shown on the Contract Plans.

b. Contractor is advised of the drainage work to be completed at this crossing.

c. **Contractor is advised that there is no option for a traffic diversion for this road crossing.** Therefore, the Contractor shall install a temporary crusher run road bypass around the crossing construction. The temporary roadway shall be graded, and compacted crusher run material installed on filter fabric through the track section to protect the existing ballast. The temporary roadway location and design shall be a means and methods approach by the Contractor. Contractor shall remove the temporary roadway in its entirety once construction is complete. Contractor shall grade, loam and seed any disturbed adjacent areas to the full satisfaction of the MassDOT field personnel and any Town or committee representatives.

d. Contractor shall submit detailed plans of the temporary road construction to MassDOT for approval.

e. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the Town of Bourne, MA for approval.

MIDDLEBORO SUBDIVISION CROSSINGS:

A. Union Road, Norton, Massachusetts – Middleboro Subdivision MP 2.83

Approximate street address for GPS/Google location ONLY:

29 Union Road, Norton, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

f. Contractor is advised that this crossing is located within CWR territory.

g. Contractor is advised of the drainage work to be completed at this crossing.

h. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Norton, MA for approval.

i. Contractor shall de-stress track 450 TF to the north and 1000 TF to the south of the crossing or as required by MCRR CWR Plan, whichever is greater.

j. Contractor is advised that there may be Environmental compliance requirements at this crossing. Contractor shall adhere to all permitting condition requirements.

2. **Signal Upgrade Work**

A complete replacement of all AHCW wayside and control facilities is required at this location including, but not limited to the following:

A. Provide a complete factory-wired railroad signal instrument case to accommodate all equipment necessary to provide safe and reliable train detection and control of AHCW equipment specified within the Contract documents. Instrument case shall include, but not limited to the following:

- AC power equipment
- Meter enclosure on the side of the case
- Motion-based train detection and AHCW control equipment
- Two (2) battery banks.
- Two (2) battery chargers.
- Power off indication LED light on each side of case.
- Manual Control Box (test and cut-out switch)
- Control facility for adjacent wayside approach signal

B. Provide foundation for instrument case installation

C. Provide the following equipment on two (2) roadway flasher layouts:

- One (1) set of 2-way 12” LED lights
- Crossbuck
- Electronic bell (on one)

D. Provide track leads and cable to all wayside equipment.

E. Provide power cable and conduit from the meter to the case.

F. Provide tell-tale LED strobe light on top of mast.

G. Remove and dispose of all retired crossing equipment and out-of-service facilities and related foundations including:

- Battery well and batteries
- Two (2) Instrument cases

H. Provide all required environmental protection facilities due to proximity of wetlands.

I. Provide clearing and grubbing around instrument case and wayside equipment within the area of approximately 1500 sq/ft

J. Relocate existing ENS signs to new masts.

B. John Scott Boulevard, Norton, Massachusetts – Middleboro Subdivision MP 3.38

Approximate street address for GPS/Google location ONLY:

501 John Scott Boulevard, Norton, MA

1. Signal Upgrade Work

A. Provide a factory-wired railroad signal instrument case complete with all equipment necessary to provide safe and reliable train detection and control of AHCW equipment specified within the Contract documents. Instrument case shall include, but not limited to the following:

- AC power equipment.
- Meter enclosure on the side of the case.
- Motion-based train detection and AHCW control equipment.
- Power off indication lights on each side of the case.
- Two (2) battery banks.
- Two (2) battery chargers.
- Manual Control Box (test and cut-out switch)

B. Provide foundation for the instrument housing.

C. Replace existing with new:

- Two (2) sets of 2-way 12” LED lights (Cantilevers)

- Four (4) sets of 1-way 12" LED lights.
  Install one set on each gate mast and one set on each cantilever mast

- Crossbucks
- Gate arms with LED flashers

D. Provide spring loaded gate arm savers.

E. Provide track leads and cable to all wayside equipment.

F. Replace existing cantilever internal wiring

G. Relocate existing meter to the side wall of instrument case.

H. Provide cable in conduit from the meter enclosure to utility service tap

I. Coordinate AC power work with Local Utility Company.

J. Provide one tell-tale LED strobe light on top of mast.

K. Remove and dispose of all retired crossing equipment and all out-of-service facilities including mast mounted signal and all related foundations.

L. Provide clearing and grubbing within the area of approximately 500 sq/ft.

M. Contractor is advised that this crossing is located within CWR territory.

N. Site specific notes:

a. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Norton, MA for approval.

B. South Worcester Street, Norton, Massachusetts – Middleboro Secondary MP 4.25

Approximate street address for GPS/Google location ONLY:

194 South Worcester Street, Norton, MA

1. **Signal Upgrade Work:**

A complete replacement of all AHCW wayside and control facilities is required at this location including, but not limited to the following:

A. Provide a factory-wired railroad signal instrument case complete with all equipment necessary to provide safe and reliable train detection and control of AHCW equipment specified within the Contract documents. Instrument case shall include, but not limited to the following:

- Utility power equipment

- Motion-based train detection and AHCW control equipment.
- Two (2) battery banks.
- Two (2) battery chargers.
- Power off indication LED light on each side of case.
- Manual Control Box (test and cut-out switch)

B. Provide foundation for instrument case.

C. Provide two (2) roadway flasher layouts, each including:

- 5” mast
- Split-base junction box.
- Concrete gate foundation.
- Crossbuck.
- One (1) set of 2-way, 12” LED flashing lights.
- One (1) electronic bell.

D. Provide track leads and cable to all wayside equipment.

E. Provide underground cable in conduit from existing meter to instrument case.

F. Provide tell-tale LED strobe light on top of mast.

G. Remove and dispose of all retired crossing equipment, battery well, all out of service facilities and related foundations.

H. Relocate existing ENS signs to new masts.

I. Contractor is advised that this crossing is located within CWR territory.

J. Site specific notes:

a. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Norton, MA for approval.

C. Woodward Street, Norton, Massachusetts – Middleboro Subdivision MP 5.87

Approximate street address for GPS/Google location ONLY:

34 Woodward Street, Norton, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

a. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

a. Contractor is advised that this crossing is located within CWR territory.

b. Contractor is advised of the drainage work to be completed at this crossing.

c. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Norton, MA for approval.

D. Harvey Street, Taunton, Massachusetts – Middleboro Subdivision MP 7.16

Approximate street address for GPS/Google location ONLY:

138 Harvey Street, Taunton, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

b. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

c. Contractor is advised of the installation of the asphalt sidewalk, and ADA perpendicular sidewalk crossing area, and the installation of ADA detectable warning panels at this crossing per the Contract Plans or as directed by MassDOT/MCRR field personnel.

d. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

d. Contractor is advised that this crossing is located within CWR territory.

b. Contractor is advised of the drainage work to be completed at this crossing.

c. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Taunton, MA for approval.

2. **Signal Upgrade Work**

A complete replacement of all AHCW wayside and control facilities is required at this location including, but not limited to the following:

A. Provide a factory-wired railroad signal instrument case complete with all equipment necessary to provide safe and reliable train detection and control of AHCW equipment specified within the Contract documents. Instrument case shall include, but not limited to the following:

- AC power equipment.
- Meter enclosure on the side of the case.
- Motion-based train detection and AHCW control equipment.
- Two (2) battery banks.
- Two (2) battery chargers.
- Power off indication LED light on each side of case.
- Manual Control Box (test and cut-out switch)

B. Provide foundation for instrument case.

C. Provide two (2) roadway flasher layouts, each including:

- 5” mast
- Split-base junction box.
- Concrete gate foundation.
- Crossbuck.
- One (1) set of 2-way, 12” LED flashing lights.

D. Provide one (1) electronic bell.

E. Provide tell-tale LED strobe light on top of mast.

F. Provide track leads and cable to all wayside equipment.

G. Relocate existing meter to new enclosure on instrument case

H. Provide underground conduit and cable from utility pole power tap to meter.

I. Coordinate AC power work with utility company

J. Remove and dispose of all retired crossing equipment, battery well, and out-of-service instrument case, including related foundations.

K. Provide clearing and grubbing within the area of approximately 300 sq/ft

L. Relocate existing ENS signs to new masts.

E. South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81

Approximate street address for GPS/Google location ONLY:

439 South Crane Ave, Taunton, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

a. Contractor is advised that this crossing is located within CWR territory.

b. Contractor is advised of the drainage work to be completed at this crossing.

c. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Taunton, MA for approval.

2. **Signal Upgrade Work**

A complete replacement of all AHCW wayside and control facilities is required at this location including, but not limited to the following:

A. Provide a factory-wired railroad signal instrument case complete with all equipment necessary to provide safe and reliable train detection and control of AHCW equipment specified within the Contract documents. Instrument case shall include, but not limited to the following:

- AC power equipment.
- Meter enclosure on the side of the case.
- Motion-based train detection and AHCW control equipment.
- Two (2) battery banks.
- Two (2) battery chargers.
- Power off indication LED light on each side of case.
- Manual Control Box (test and cut-out switch)

B. Provide foundation for instrument housing.

C. Provide two (2) roadway flasher layouts, each including:

- 5” mast
- Split-base junction box.
- Concrete gate foundation.
- Crossbuck.
- One (1) set of 2-way, 12” LED flashing lights.

D. Provide one (1) electronic bell.

E. Provide track leads and cable to all wayside equipment.

F. Provide tell-tale LED strobe light on top of mast.

G. Relocate meter to instrument case meter enclosure.

H. Remove existing power pole and replace with identical new pole

I. Provide underground cable in conduit from new meter enclosure up to a power tap on new pole.

J. Coordinate AC power work with utility company

K. Remove and dispose of all retired crossing equipment, battery well, out-of-service instrument case and related foundations.

L. Provide clearing and grubbing around within the area of approximately 400 sq/ft

M. Relocate existing ENS signs to new masts

F. Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97

Approximate street address for GPS/Google location ONLY:

8 Harrison Ave, Taunton, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4" dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4" dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 136RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation "box" and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation "box" on either side of the track as shown on the Contract Plans.

b. Contractor is advised of the installation of the asphalt sidewalk, and ADA perpendicular sidewalk crossing area, and the installation of ADA detectable warning panels at this crossing per the Contract Plans or as directed by MassDOT/MCRR field personnel.

c. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

a. Contractor is advised of the drainage work to be completed at this crossing.

b. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Taunton, MA for approval.

3. Signal Upgrade Work

A complete replacement of all AHCW wayside and control facilities is required at this location including, but not limited to the following:

A. Provide a factory-wired railroad signal instrument case complete with all equipment necessary to provide safe and reliable train detection and control of AHCW equipment specified within the Contract documents. Instrument case shall include, but not limited to the following:

- AC power equipment.
- Meter enclosure on the side of the case.
- Motion-based train detection and AHCW control equipment.
- Two (2) battery banks.
- Two (2) battery chargers.
- Power off indication LED light on each side of case.
- Manual Control Box (test and cut-out switch)

B. Provide foundation for instrument housing.

C. Provide two (2) roadway gate and flasher layouts, each including:

- 5” mast
- Split-base junction box.
- Concrete gate foundation.
- Crossbuck.
- One (1) set of 2-way, 12” LED flashing lights.
- Gate mechanism with counterweights
- Gate arm with LED flashers
- Gate arm breakaway adapters

D. Provide one (1) electronic bell.

E. Provide track leads and cable to all wayside equipment.

F. Install meter to instrument case meter enclosure.

G. Provide underground cable in conduit from meter enclosure up to a power tap on existing pole.

H. Coordinate AC power work with utility company

I. Remove and dispose of all retired crossing equipment and out-of-service facilities including related foundations.

J. Provide clearing and grubbing within the area of approximately 1400 sq/ft

K. Relocate existing ENS signs to new masts.

G. Somerset Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 11.10

Approximate street address for GPS/Google location ONLY:

43 Somerset Avenue, Taunton, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

b. Contractor is advised of the installation of the concrete sidewalk, and “END OF SIDEWALK” signage at this crossing per the Contract Plans or as directed by MassDOT/MCRR field personnel.

c. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

d. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Taunton, MA for approval.

H. Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25

Approximate street address for GPS/Google location ONLY:

261 Weir Street, Taunton, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 136RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation "box" and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation "box" on either side of the track as shown on the Contract Plans.

b. Contractor is advised of the installation of the asphalt sidewalk and the installation of ADA detectable warning panels at this crossing per the Contract Plans or as directed by MassDOT/MCRR field personnel.

c. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

a. Contractor shall replace all existing HMA sidewalk with granite curbing disturbed during construction of the at-grade crossing surface in order to remain in compliance with any and all ADA requirements as shown on the Contract Plans.

b. Contractor is advised of the drainage work to be completed at this crossing.

c. Contractor will furnish and install guardrail with end treatment at the locations shown on the Contract Plans.

d. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Taunton, MA for approval.

3. **Signal Upgrade Work**

A complete replacement of all AHCW wayside and control facilities is required at this location including, but not limited to the following:

A. Provide a factory-wired railroad signal instrument case complete with all equipment necessary to provide safe and reliable train detection and control of AHCW equipment specified within the Contract documents. Instrument case shall include, but not limited to the following:

- AC power equipment;
- Meter enclosure on the side of the case;
- Motion-based train detection and AHCW control equipment;
- Two (2) battery banks.
- Two (2) battery chargers.
- Power off indication LED light on each side of case.

- Manual Control Box (test and cut-out switch)

B. Provide foundation for instrument housing;

C. Provide two (2) roadway gate and flasher layouts, each including:

- 5” mast
- Split-base junction box;
- Concrete gate foundation;
- Crossbuck;
- One (1) set of 2-way, 12” LED flashing lights.
- Gate mechanism with counterweights
- Gate arm with LED flashers
- Gate arm breakaway adapters

D. Provide one (1) electronic bell.

E. Provide track leads and cable to all wayside equipment.

F. Install meter to instrument case meter enclosure.

G. Provide underground cable and conduit from utility company’s manhole to a meter.

H. Coordinate AC power work with utility company

I. Provide clearing and grubbing within the area of approximately 1700 sq/ft

J. Relocate existing ENS signs to new masts.

I. Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17

Approximate street address for GPS/Google location ONLY:

24 Hart Street, Taunton, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation "box" and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation "box" on either side of the track as shown on the Contract Plans.

b. Contractor is advised of the installation of the asphalt sidewalk, and the installation of ADA detectable warning panels at this crossing per the Contract Plans or as directed by MassDOT/MCRR field personnel.

c. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

a. Contractor shall replace all existing HMA sidewalk disturbed during construction of the at-grade crossing surface in order to remain in compliance with any and all ADA requirements as shown on the Contract Plans.

b. Contractor shall clean the Railroad ROW of old ties and utility poles as shown on the contract plans or as directed by MassDOT/MCRR personnel.

c. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the City of Taunton, MA for approval.

3. **Signal Upgrade Work**

A complete replacement of all AHCW wayside and control facilities is required at this location including, but not limited to the following:

A. Provide a factory-wired railroad signal instrument case complete with all equipment necessary to provide safe and reliable train detection and control of AHCW equipment specified within the Contract documents. Instrument case shall include, but not limited to the following:

- AC power equipment.
- Meter enclosure on the side of the case.
- Motion-based train detection and AHCW control equipment.
- Two (2) battery banks.
- Two (2) battery chargers.
- Power off indication LED light on each side of case.
- Manual Control Box (test and cut-out switch)

B. Provide foundation for instrument housing.

C. Provide two (2) roadway gate and flasher layouts, each including:

- 5" mast
- Split-base junction box;

- Concrete gate foundation;
- Crossbuck;
- One (1) set of 2-way, 12” LED flashing lights.
- Gate mechanism with counterweights
- Gate arm with LED flashers
- Gate arm breakaway adapters

D. Provide one (1) electronic bell.

E. Provide track leads and cable to all wayside equipment.

F. Provide tell-tale LED strobe light on top of mast.

G. Install meter to instrument case meter enclosure.

H. Provide underground cable and conduit from the meter enclosure up to a power tap on utility pole.

I. Coordinate AC power work with utility company

J. Remove and dispose of all retired crossing equipment and out-of-service facilities including related foundations including:

- Abandoned Signal with foundation
- Abandoned 2nd foundation,
- Battery well and batteries
- Existing instrument case and foundation
- All retired grade crossing equipment and facilities
- Pole with crossarm

K. Relocate existing ENS signs to new masts.

FRAMINGHAM SECONDARY CROSSINGS:

A. Elm Street, Foxborough, Massachusetts – Framingham Secondary MP 1.89

Approximate street address for GPS/Google location ONLY:

75 Elm Street, Foxborough, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

b. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

  a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

  a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

  b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

  a. Contractor is advised that this crossing is located within CWR territory.

  b. Contractor shall replace all existing HMA sidewalk disturbed during construction of the at-grade crossing surface in order to remain in compliance with any and all ADA requirements as shown on the Contract Plans.

  c. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the Town of Foxborough, MA for approval.

  d. Contractor is advised of the drainage work to be completed at this crossing.

B. Chestnut Street, Foxborough, Massachusetts – Framingham Secondary MP 3.49

Approximate street address for GPS/Google location ONLY:

40 Chestnut Street, Foxborough, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

  e. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

  a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

  a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation "box" on either side of the track as shown on the Contract Plans.

b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

a. Contractor is advised that this crossing is located within CWR territory.

b. Contractor shall replace all existing HMA sidewalk disturbed during construction of the at-grade crossing surface in order to remain in compliance with any and all ADA requirements as shown on the Contract Plans.

c. Contractor is advised of the drainage work to be completed at this crossing.

d. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the Town of Foxborough, MA for approval.

2. **Signal Upgrade Work**

A. Field verify and update existing as-in-service drawings to CAD format.

B. Provide the following equipment:

- Motion-based train detection
- Power off indication lights on each side of case.
- Two (2) battery banks.
- Two (2) battery chargers.
- Crossbucks with mounting brackets
- Manual Control Box (test and cut-out switch)

C. South Street, Medfield, Massachusetts – Framingham Secondary MP 11.48

Approximate street address for GPS/Google location ONLY:

166 South Street, Medfield, MA

1. **Track and Grade Crossing Surface Work**

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4" dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4" dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

   a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

  C. Roadway work:

   a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation "box" and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation "box" on either side of the track as shown on the Contract Plans.

   b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

  D. Site specific notes:

   a. Contractor is advised that this crossing is located within CWR territory.

   b. Contractor shall replace all existing HMA sidewalk disturbed during construction of the at-grade crossing surface in order to remain in compliance with any and all ADA requirements as shown on the Contract Plans.

   c. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the Town of Medfield, MA for approval.

D. West Street, Medfield, Massachusetts – Framingham Secondary MP 13.26

Approximate street address for GPS/Google location ONLY:

35 West Street, Medfield, MA

1. Track and Grade Crossing Surface Work

  A. Signal conduit:

   a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4" dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4" dia. cross roadway conduits (two on either side of the track).

  B. Crossing Surface:

   a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

  C. Roadway work:

   a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation "box" and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation "box" on either side of the track as shown on the Contract Plans.

b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

c. Contractor is advised that this crossing is located within CWR territory.

d. Contractor shall replace all existing HMA sidewalk disturbed during construction of the at-grade crossing surface in order to remain in compliance with any and all ADA requirements as shown on the Contract Plans.

e. Contractor is advised of the drainage work to be completed at this crossing.

f. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the Town of Medfield, MA for approval.

E. North Main Street, Sherborn, Massachusetts – Framingham Secondary MP 17.70

Approximate street address for GPS/Google location ONLY:

19 North Main Street, Sherborn, MA

1. Track and Grade Crossing Surface Work

A. Signal conduit:

a. Contractor is advised that signal conduits shall be installed at this crossing. Contractor shall install four (4) GRS, 4” dia. cross track conduits (two at either end) and four (4) PVC Sched. 80, 4” dia. cross roadway conduits (two on either side of the track).

B. Crossing Surface:

a. Rubber rail seal compatible with 115RE rail and double shoulder plate shall be used.

C. Roadway work:

a. Asphalt shall be installed at the proposed roadway elevations. Asphalt shall be installed between the field side rubber and edge of excavation “box” and between the gauge side rubber as shown on the Contract Plans. Roadway pavement extends beyond the excavation “box” on either side of the track as shown on the Contract Plans.

b. Contractor shall paint or repaint all grade crossing pavement markings in accordance with MUTCD and furnish or replace all grade crossing advance warning signs.

D. Site specific notes:

a. Contractor is advised that this crossing is located within CWR territory.

b. Contractor is advised of the drainage work to be completed at this crossing.

c. Contractor is advised that a Traffic Management Plan for the crossing must be submitted to the Town of Sherborn, MA for approval.

F. Furnish for installation by others Constant Warning Time based train detection equipment (Alstom XP-4 predictor) and Shunt Augmenter (Genesis t-Ex) at the following locations on Cape Main:

1. Spring Hill Road Sandwich Massachusetts MP 63.56
2. Atkins Road Barnstable Massachusetts MP 65.15
3. Rt.6A Barnstable Massachusetts MP 69.95

2. All work and material specified or described in this Scope of Work for the construction of each of the at-grade crossings shall be considered incidental to the work and shall be included in the Bid price of each crossing.

CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL TRASH, TRACKWORK PACKAGING MATERIALS, CONSTRUCTION DEBRIS, AND ALL OTHER PROJECT-RELATED EQUIPMENT AND SUPPLIES FROM THE RIGHT-OF-WAY AND ADJACENT AREAS AT THE END OF EACH SHIFT AND UPON COMPLETION OF THE PROJECT WORK.

END OF SECTION

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

PROJECT BID SCHEDULE

Bids for the Middleboro Subdivision, Framingham Secondary, Cape Main, Falmouth and South Dennis Lines At-Grade Crossing Surface Rehabilitation Project must be submitted to Mass Coastal Railroad (MCRR) by **2:00 pm Thursday, May 26, 2022.** Bids will be opened immediately thereafter and analyzed by MCRR.

The Pre-Bid Meeting and Site Inspection are scheduled for **Tuesday, May 17, 2022 at 10:00 AM.** A short meeting will be held at the Mass Coastal RR office at 12 Harding St., Unit 202, Lakeville, MA 02347. A site tour of a few representative crossings will be conducted by Owner, Owner's Consultants and Massachusetts Coastal Railroad, LLC (MCRR or Railroad) staff immediately following the meeting.

Attendance at both the pre-bid meeting and on-site inspection is mandatory for all prospective bidders. All attendees accessing Railroad R-O-W must have the proper Personal Protection Equipment (PPE) required by MCRR including reflective vest, hardhat, safety glasses and safety toed boots. All attendees must at all times comply with all federal, state and local directives, ordinances, laws, health orders and regulations as they concern the COVID-19 pandemic.

Contractor questions concerning the Bid Package are due by **4:00 pm Friday, May 20, 2022**. Contractor questions should be submitted to Rob Finley of MCRR at **rcfinley@verizon.net**. It is requested that Contractor questions also be sent via email to**: peter.cruz@jacobs.com**. Responses to questions will be provided by **4:00 pm Tuesday, May 24, 2022**.

The apparent successful bidder will receive notification of their status on **Friday, June 3, 2022,** and pending approval by Owner, Notice to Proceed (NTP) would be anticipated by **Friday, June 17, 2022**.

Crossings located at:

- Mary Dunn Road, Barnstable, Massachusetts – Cape Main MP 74.15
- Marstons Lane, Barnstable, Massachusetts – Cape Main MP 75.28
- Bell Road, Bourne, Massachusetts – Falmouth Line MP 0.40
- Union Road, Norton, Massachusetts – Middleboro Subdivision MP 2.83
- John Scott Boulevard, Norton, Massachusetts – Middleboro Subdivision MP 3.38
- South Worcester Street, Norton, Massachusetts – Middleboro Subdivision MP 4.25
- Woodward Street, Norton, Massachusetts – Middleboro Subdivision MP 5.87
- Harvey Street, Taunton, Massachusetts – Middleboro Subdivision MP 7.16
- South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81
- Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97
- Somerset Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 11.10
- Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25
- Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17
- Elm Street, Foxborough, Massachusetts – Framingham Secondary MP 1.89
- Chestnut Street, Foxborough, Massachusetts – Framingham Secondary MP 3.49

- South Street, Medfield, Massachusetts – Framingham Secondary MP 11.48
- West Street, Medfield, Massachusetts – Framingham Secondary MP 13.26
- North Main Street, Sherbon, Massachusetts – Framingham Secondary MP 17.70

Contractors are reminded that the Cape Main, Middleboro Subdivision, Framingham Secondary, Falmouth Lines are all active rail corridors. Train Operations are dictated by MCRR & CSX freight trains and customer needs. Every effort will be made by Railroad to accommodate the Contractor in accessing the sites to perform the work. Contractor should refer to the Train Operation Schedule and available work window information.

Please note the production and equipment requirements specified in the Scope of Work as these have a direct effect on meeting the project schedule. In addition, please note that there are track materials which will need to be supplied by Contractor as part of this project. Material requirements are included as part of the full set of Bid Documents.

END OF SECTION

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

BID FORM

The undersigned, identified as Bidder, declares that Bidder has carefully reviewed and examined the Contract Documents including Notice to Bidders, Project Description, Scope of Work, Project Bid Schedule, Bid Form, Change Order Form, Train Operations Schedule, Technical Specifications, Special Conditions, General Conditions, Schedule of Prevailing Wage Rates, Track Chart, Roadway Worker Protection Manual and On-Track Safety Program Massachusetts Coastal Railroad, Environmental Permits, Plans and other supporting documents (including Addenda thereto), and that Bidder has examined the site upon which the Project Work is to be performed.

After review of all Contract Documents and attesting to understanding and acceptance of same, the undersigned Bidder proposes to furnish all necessary labor, materials (other than those materials stipulated in the Special Conditions as being furnished by Owner), equipment, machinery and tools required to complete the Work as described and specified in the Contract Documents. Bidder understands and agrees that current prevailing wage rates are to be paid in accordance with applicable laws, the Contract General Conditions, and as set forth in this Bid Form.

The undersigned agrees, if awarded the Contract, to substantially complete the Work on the Cape Main, Middleboro Subdivision, Framingham Secondary, Falmouth Line At-Grade Crossing Surface Rehabilitation Project by **Friday, December 16, 2022. Please refer to the Project Description and Scope of Work for specific crossing construction completion requirements and possible time of year work restrictions.**

This proposal includes a Bid Bond in the amount of 5% of the Total Amount of Bid identified herein.

In submitting this Bid, Bidder represents that:

1. Bidder has examined copies of all the Contract Documents, including the Addenda thereto:
2. Bidder has examined the site and locality where the Work is to be performed, the legal requirements (federal, state, and local laws, ordinances, rules, and regulations) and the conditions affecting cost, progress, or performance of the Work, and has made such independent investigations as Bidder deems necessary to complete this Bid and carry out the Work in accordance therewith.
3. The Bid is based on the prevailing wage rates identified for the Work to be performed as set forth in the Contract Documents, and as required by applicable laws.

4. This Bid is genuine and not made in the interest or on behalf of any undisclosed person, firm, or corporation; the Bid is not submitted in conformity with any agreement of rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or a corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for Bidder any advantage over any other Bidder.

The undersigned further agrees to perform the Work in its entirety in accordance with the Contract Documents within the prescribed time, and to the total and complete satisfaction of Owner (in consultation with their Authorized Representatives), at the identified Unit Prices and Lump Sum Amounts as set forth below:

1. Pre-Construction Survey and As-Built Plans

Bid price to complete all pre-construction survey, survey plans and as-built plans necessary for the work associated with the Middleboro Subdivision, Framingham Secondary, Cape Main, Falmouth and South Dennis Lines At-Grade Crossing Surface Crossing work in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA Standards. Hard copy and CAD as-built plans to be submitted to Jacobs for MassDOT review and archiving,

Bid Price for Pre-Construction Survey and As-Built Plans

Pre-Construction Survey ____ (___________________).
Written in Words In Figures

As-Built Plans ____ (___________________).
Written in Words In Figures

Total Bid Item #1 Price ____ (___________________).
Written in Words In Figures

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2. Additional De-Stressing of Up to 10,000 Linear Feet (LF) of Existing 115RE or 131RE Continuously Welded Rail (CWR) and Furnish and Install Up to 35 (EA) Thermite Welds

Bid price to complete up to 10,000 LF of additional de-stressing work and furnish and install up to 35 (EA) thermite welds beyond the limits as shown on the plans for the crossings shall be included in the lump sum price of the crossings as described and incidentals associated with the thermal de-stressing of existing 115RE or 131RE CWR as specified in the Contract Plans, Scope of Work, Technical Specifications, General Conditions and Special Conditions, and conform to all applicable AREMA practices, MassDOT MW-1, Keolis MW-1, and MBTA Standards and Specifications. Bid price shall include all labor, material, equipment, machinery and tools necessary to finish the work, complete and accepted by the Engineer.

Removal and re-installation of rail anchors, e clips, removal and/or popping of rail spikes, furnish and install of rail spikes, furnish and install liquid compound plugging of tie holes, install or replace removed or missing OTM and for all other items required to finish the de-stressing work are to be considered incidental to Bid Item #2.

Bid Price to De-Stress Up to 10,000 Linear Feet (LF) of Existing 115RE or 131RE Continuously Welded Rail (CWR) and Furnish and Install Up to 35 (EA) Thermite Welds

F&I Thermite Weld Unit Price (per EA) ____________________________ (____________________).
Written in Words In Figures

A. Subtotal Bid Price
F&I Thermite Weld
Up to (Unit Price x 35) ____ (____________________).
Written in Words In Figures

De-Stress CWR Unit Price (per LF) ________________________________ (____________________).
Written in Words In Figures

B. Subtotal Price Bid
De-stress of CWR
Up to (Unit Price X 10,000) ___________________________________ (____________________).
Written in Words In Figures

Total Price Bid Item #2
(Total of A + B) ____ (____________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

3. Installation of up to 195 Linear Feet (LF) of 107NH Additional Replacement Rail

The purpose of this **Bid Item is to meet any possible 107NH rail replacement requirements beyond the limits shown on the Contract Plans** or otherwise stated in the Contract Bid Documents. Bid price to install up to 195 LF of 107NH relay rail as directed in the field by MassDOT/MCRR. Contractor shall supply all joint bolt assemblies, rail anchors and track spikes necessary for the replacement rail. Replacement rail, tie plates and joint bars required are to be furnished by MassDOT. Installation of replacement rail shall be in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA Standards. Bid price shall include all labor, material, equipment, machinery and tools necessary to handle, transport and install replacement rail, and for all other incidentals required to finish the work, complete and accepted by Engineer.

Bid Price to Install Additional Replacement Rail

Unit Price (per LF of Rail) ____ (____________________).
Written in Words In Figures

Total Price Bid Item #3
Up to (Unit Price X 195) ____ (____________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

4. Furnish and Install Up to 850 TON of Additional Hot Mix Asphalt (HMA) Pavement

The purpose of this **Bid Item is to meet any possible paving requirements beyond the limits shown on the Contract Plans** or otherwise stated in the Contract Bid Documents. The furnishing and installation of HMA as shown in the Contract Plans and as described in the Scope of work and Contract documents shall be considered incidental to the crossing work and not included in this Bid Item. Bid price to furnish and install up to 850 TON of HMA pavement as directed by the Owner’s representative or Railroad in the field. HMA installation shall be as specified in Technical Specifications and Special Conditions. Bid price shall include all labor, material, equipment, machinery and tools necessary to furnish and install the HMA grade crossing pavement and for all other incidentals required to finish the work, complete and accepted by Engineer.

Bid Price to Furnish and Install Additional HMA Pavement

Unit Price (per TON HMA) ____________________________________ (__________________).
Written in Words In Figures

Total Price Bid Item #4
Up to (Unit Price X 850) ______________________________________ (__________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

5. Furnish and Install up to an Additional 350 (EA) New 8’-6” Wood Crossties with OTM

The purpose of this **Bid Item is to meet any possible additional spot crosstie replacement requirements beyond the quantities specified in the Scope of Work and Contract Plans** or otherwise stated in the Contract Bid Documents. The installation of crossties as shown in the Contract Plans and as described in the Scope of work and Contract documents shall be considered incidental to the crossing work and not included in this Bid Item. Bid price to furnish and install up to 350 additional wood crossties as directed by the Owner’s representative or Railroad in the field. Crosstie installation shall be as specified in Technical Specifications and Special Conditions. Contractor shall supply all track spikes and anchors necessary for the installation of crossties. 115RE replacement tie plates required (as directed by the Railroad/Owner) shall be furnished by the Contractor, 107NH relay plates (if required) shall be provided by MassDOT. Bid price shall include all labor, material, equipment, machinery and tools necessary to install the new 8’-6” crossties and for all other incidentals required to finish the work, complete and accepted by Engineer.

Bid Price to Furnish and Install up to an Additional 350 (EA) New Wood Crossties

Furnish and Install wood crosstie
Unit Price (per EA Crosstie) ____________________________________ (___________________).
Written in Words In Figures

Total Price Bid Item #5
Up to (Unit Price X 350) _______________________________________ (___________________).
Written in Words In Figures

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6. Furnish four (4) Constant Warning Time Train Detection Equipment (Predictors)

The purpose of this **Bid Item is to furnish four (4) Constant Warning Time Train Detection Equipment (Predictors) complete with four (4) shunt augmenters as specified in the Scope of Work** or otherwise stated in the Contract Bid Documents. The Constant Warning Time based train detection equipment (Alstom XP-4 predictor) is to control AHCW equipment at the following grade crossings:

- Route 6A in Barnstable on Cape Main MP 69.95
- Spring Hill Road in Sandwich MA on Cape Main MP 63.56
- Atkins Road in Sandwich MA on Cape Main MP 65.15
- Mary Dunn Road in Barnstable MA on Cape Main MP 74.15

Contractor shall supply all hardware necessary for the installation of the Constant Warning Time based train detection equipment (Alstom XP-4 predictor) complete with four (4) shunt augmenters. Bid price shall include only furnishing of the equipment as specified herein for installation by others in accordance with Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Standards.

The Contractor shall deliver the predictors with shunt augmenters to the railroad at 12 Harding Street, Unit 202, Lakeville, MA 02347

Bid Price to Furnish four (4) EA Constant Warning Time Based Train Detection Equipment (Alstom XP-4 predictor) complete with four (4) EA shunt augmenters**:**

Furnish Predictors with Shunt Augmenters
Unit Price (per EA) ________________________________ (__________________).
Written in Words In Figures

Total Price Bid Item #6
Up to (Unit Price X 4) ___________________________________ (__________________).
Written in Words In Figures

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7. Rehabilitation of the Public At-Grade Crossing Located at Mary Dunn Road, Barnstable, Massachusetts – Cape Main MP 74.15

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; spot tie replacement, box anchor crossing and crossing approaches; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; installation of signal conduits; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance in the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Mary Dunn Road, Barnstable, Massachusetts – Cape Main MP 74.15.

All work related to the Mary Dunn Road crossing at Cape Main MP 74.15 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Mary Dunn Road, Barnstable, Massachusetts – Cape Main MP 74.15

Crossing Lump Sum
Price Bid Item #7 ____ (___________________).
Written in Words In Figures

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8. Signal Upgrade of the At-Grade Public Crossing Located at Marstons Lane, Barnstable MA – Cape Main MP 75.28

Bid price for: traffic management, all labor, material, equipment, machinery, and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the Marstons Lane crossing at Cape Main MP 75.28 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at Marstons Lane, Barnstable MA – Cape Main MP 75.28

Signal Upgrade Lump Sum
Price Bid Item #8____ (____________________).
Written in Words In Figures

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9. Rehabilitation of the Public At-Grade Crossing Located at Bell Road, Bourne, Massachusetts – Falmouth Line MP 0.40

Bid price for: traffic management; temporary bypass road; clearing and grubbing; wayside ditching and paved drainage swales; spot tie replacement, box anchor crossing and crossing approaches; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; installation of signal conduits; installation of signage; installation of compacted ballast truck pad construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance in the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Bell Road, Bourne, Massachusetts – Falmouth Line MP 0.40

All work related to the Bell Road crossing at Falmouth Line MP 0.40 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Bell Road, Bourne, Massachusetts – Falmouth Line MP 0.40

Crossing Lump Sum
Price Bid Item #9 ______________________________________ (___________________).
Written in Words In Figures

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10. Rehabilitation of the Public At-Grade Crossing Located at Union Road, Norton, Massachusetts – Middleboro Subdivision MP 2.83

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; spot tie replacement, box anchor crossing and crossing approaches; installation of signal conduits; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 450 TF to the north and 1000 TF to the south of the crossing of the existing 115RE CWR and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Union Road, Norton, Massachusetts – Middleboro Subdivision MP 2.83.

All work related to Union Road crossing at Middleboro Subdivision MP 2.83 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Union Road, Norton, Massachusetts – Middleboro Subdivision MP 2.83

Crossing Lump Sum
Price Bid Item #10____ (____________________).
Written in Words In Figures

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11. Signal Upgrade of the At-Grade Public Crossing Located at Union Road, Norton, MA – Middleboro Subdivision MP 2.83

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the Union Road, Norton, Massachusetts Middleboro Subdivision MP 2.83 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at Union Road, Norton, Massachusetts – MP 2.83

Signal Upgrade Lump Sum
Price Bid Item #11____ (___________________).
Written in Words In Figures

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12. Signal Upgrade of the Public At-Grade Crossing Located at John Scott Boulevard Norton, MA – Middleboro Subdivision MP 3.38

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the John Scott Boulevard Norton, MA – Middleboro Subdivision MP 3.38 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at John Scott Boulevard Norton, MA – Middleboro Subdivision MP 3.38

Signal Upgrade Lump Sum
Price Bid Item #12____ (___________________).
Written in Words In Figures

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13. Signal Upgrade of the At-Grade Crossing Located at South Worcester Street Norton, MA – Middleboro Subdivision MP 4.26

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the South Worcester Street Norton, MA – Middleboro Subdivision MP 4.26 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at South Worcester Street Norton, MA – Middleboro Subdivision MP 4.26

Signal Upgrade Lump Sum
Price Bid Item #13____ (____________________).
Written in Words In Figures

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14. Rehabilitation of the Public At-Grade Crossing Located at Woodward Street, Norton, Massachusetts – Middleboro Subdivision MP 5.87

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; spot tie replacement, box anchor crossing and crossing approaches; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 500 TF of existing 115RE CWR from both ends of the crossing and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Woodward Street, Norton, Massachusetts – Middleboro Subdivision MP 5.87.

All work related to the Woodward Street crossing at Middleboro Subdivision MP 5.87 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Woodward Street, Norton, Massachusetts – Middleboro Subdivision MP 5.87

Crossing Lump Sum
Price Bid Item #14____ (__________________).
Written in Words In Figures

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15. Rehabilitation of the Public At-Grade Crossing Located at Harvey Street, Taunton, Massachusetts – Middleboro Subdivision MP 7.16

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; spot tie replacement, box anchor crossing and crossing approaches; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 500 TF of existing 115RE CWR from both ends of the crossing and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Harvey Street, Taunton, Massachusetts – Middleboro Subdivision MP 7.16.

All work related to the Harvey Street crossing at Middleboro Subdivision MP 7.16 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Harvey Street, Taunton, Massachusetts – Middleboro Subdivision MP 7.16

Crossing Lump Sum
Price Bid Item #15____ (____________________).
Written in Words In Figures

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16. Signal Upgrade of the Public At-Grade Crossing Located at Harvey Street Taunton, MA – Middleboro Subdivision MP 7.16

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the Harvey Street Taunton, Massachusetts – MP 7.16 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at Harvey Street Taunton, Massachusetts – MP 7.16

Signal Upgrade Lump Sum
Price Bid Item #16____ (___________________).
Written in Words In Figures

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17. Rehabilitation of the Public At-Grade Crossing Located at South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; spot tie replacement, box anchor crossing and crossing approaches; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 500 TF of existing 115RE CWR from both ends of the crossing and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81.

All work related to the South Crane Avenue crossing at Middleboro Subdivision MP 7.81as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81

Crossing Lump Sum
Price Bid Item #17 ____ (__________________).
Written in Words In Figures

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18. Signal Upgrade of the Public At-Grade Crossing Located at South Crane Avenue, Taunton, MA – Middleboro Subdivision MP 7.81

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the Crane Ave South, Taunton, MA Middleboro Subdivision MP 7.81 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at South Crane Avenue, Taunton, MA – Middleboro Subdivision MP 7.81

Signal Upgrade Lump Sum
Price Bid Item #18____ (___________________).
Written in Words In Figures

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19. Rehabilitation of the Public At-Grade Crossing Located at Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; spot tie replacement, box anchor crossing and crossing approaches; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; installation of signage; reconstruction of existing HMA sidewalk with granite curbing; installation of detectable warning panels; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance in the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97.

All work related to the Harrison Avenue crossing at Middleboro Subdivision MP 10.97as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97

Crossing Lump Sum
Price Bid Item #19 ______________________________________ (____________________).
Written in Words In Figures

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20. Signal Upgrade of the Public At-Grade Crossing Located at Harrison Avenue, Taunton, MA – Middleboro Subdivision MP 10.97

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the Harrison Avenue, Taunton, MA Middleboro Subdivision MP 10.97 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at Harrison Ave Taunton, Massachusetts – MP 10.97

Signal Upgrade Lump Sum
Price Bid Item #20____ (___________________).
Written in Words In Figures

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21. Rehabilitation of the Public At-Grade Crossing Located at Somerset Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 11.10

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; spot tie replacement, box anchor crossing and crossing approaches; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; reconstruction of existing concrete sidewalk with granite curbing; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance in the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Somerset Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 11.10.

All work related to the Somerset Avenue crossing at Middleboro Subdivision MP 11.10 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Somerset Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 11.10

Crossing Lump Sum
Price Bid Item #21 ____ (____________________).
Written in Words In Figures

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22. Rehabilitation of the Public At-Grade Crossing Located at Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; reconstruction of existing HMA sidewalk with granite curbing; installation of detectable warning panels; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance in the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25.

All work related to the Weir Street crossing at Middleboro Subdivision MP 11.25 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25

Crossing Lump Sum
Price Bid Item #22 ____ (___________________).
Written in Words In Figures

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23. Signal Upgrade of the Public At-Grade Crossing Located at Weir Street, Taunton, MA – Middleboro Subdivision MP 11.25

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the Wier Street, Taunton, MA Middleboro Subdivision MP 11.25 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at Wier Street Taunton, Massachusetts – MP 11.25

Signal Upgrade Lump Sum
Price Bid Item #23____ (___________________).
Written in Words In Figures

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24. Rehabilitation of the Public At-Grade Crossing Located at Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; reconstruction of existing HMA sidewalk; installation of detectable warning panels; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance in the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17.

All work related to the Hart Street crossing at Middleboro Subdivision MP 12.17as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17

Crossing Lump Sum
Price Bid Item #24 ____ (____________________).
Written in Words   In Figures

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25. Signal Upgrade of the Public At-Grade Crossing Located at Hart Street, Taunton, MA – Middleboro Subdivision MP 12.17

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the Wier Street, Taunton, MA Middleboro Subdivision MP 11.25 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at Hart Street Taunton, Massachusetts – MP 12.17

Signal Upgrade Lump Sum
Price Bid Item #25____ (____________________).
Written in Words In Figures

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26. Rehabilitation of the Public At-Grade Crossing Located at Elm Street, Foxborough, Massachusetts – Framingham Secondary MP 1.89

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; reconstruction of existing HMA sidewalk with bituminous curbing; installation of detectable warning panels; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 500 TF of existing 136RE CWR from both ends of the crossing and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Elm Street, Foxborough, Massachusetts – Framingham Secondary MP 1.89.

All work related to the Elm Street crossing at Framingham Secondary MP 1.89 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Elm Street, Foxborough, Massachusetts – Framingham Secondary MP 1.89

Crossing Lump Sum
Price Bid Item #26 ____ (____________________).
Written in Words In Figures

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27. Rehabilitation of the Public At-Grade Crossing Located at Chestnut Street, Foxborough, Massachusetts – Framingham Secondary MP 3.49

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; reconstruction of existing HMA sidewalk; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 500 TF of existing 136RE CWR from both ends of the crossing and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at Chestnut Street, Foxborough, Massachusetts – Framingham Secondary MP 3.49.

All work related to the Chestnut Street crossing at Framingham Secondary MP 3.49as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at Chestnut Street, Foxborough, Massachusetts – Framingham Secondary MP 3.49

Crossing Lump Sum
Price Bid Item #27 ____ (__________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

28. Signal Upgrade of the Public At-Grade Crossing Located at Chestnut Street, Foxborough MA – Framingham Secondary MP 3.49

Bid price for: traffic management, all labor, material, equipment, machinery and tools required for the signal upgrade of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1, MUTCD and AREMA Recommendations.

All work related to the Chestnut Street, Foxborough MA Framingham Secondary MP 3.49 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Signal Upgrade of the Public At-Grade Crossing Located at Chestnut Street, Foxborough MA Framingham Secondary MP 3.49

Signal Upgrade Lump Sum
Price Bid Item #28____ (___________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

29. Rehabilitation of the Public At-Grade Crossing Located at South Street, Medfield, Massachusetts – Framingham Secondary MP 11.48

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; reconstruction of existing HMA sidewalk with granite curbing; installation of detectable warning panels; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 500 TF of existing 131RE/136RE CWR from both ends of the crossing and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at South Street, Medfield, Massachusetts – Framingham Secondary MP 11.48.

All work related to the South Street crossing at Framingham Secondary MP 11.48 as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at South Street, Medfield, Massachusetts – Framingham Secondary MP 11.48

Crossing Lump Sum
Price Bid Item #29 ____ (__________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

30. Rehabilitation of the Public At-Grade Crossings Located at West Street, Medfield, Massachusetts – Framingham Secondary MP 13.26

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 500 TF of existing 131RE/136RE CWR from both ends of the crossing and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at West Street, Medfield, Massachusetts – Framingham Secondary MP 13.26.

All work related to the two track West Street crossings at Framingham Secondary MP 13.26as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossings Located at West Street, Medfield, Massachusetts – Framingham Secondary MP 13.26

Crossing Lump Sum
Price Bid Item #30 ____ (___________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

31. Rehabilitation of the Public At-Grade Crossing Located at North Main Street, Sherborn, Massachusetts – Framingham Secondary MP 17.70

Bid price for: traffic management; clearing and grubbing; wayside ditching and paved drainage swales; saw-cutting pavement, demolition, removal and disposal of existing track and roadway material; excavation and wasting of excavated material; reconstruction of existing HMA sidewalk with granite curbing; installation of detectable warning panels; installation of signage; construction of new track structure, rail, and OTM; installation of joints, compromise joint bars or welds; ballast, surface, line and tamp track; pavement markings; installation of new rubber rail seal and HMA paving; rail destressing of 500 TF of existing 131RE/136RE CWR from both ends of the crossing and all work required for the completion of the rehabilitation of the at-grade crossing as shown on the Contract Plans and in accordance with the Scope of Work, Technical Specifications, Special Conditions, General Conditions, MassDOT MW-1 and AREMA practices. Bid price shall include all labor, material, equipment, machinery and tools necessary to complete the rehabilitation of the Public At-Grade Crossing Located at North Main Street, Sherborn, Massachusetts – Framingham Secondary MP 17.70.

All work related to the North Main Street crossing at Framingham Secondary MP 17.70as described in the Scope of Work, Contract Documents and as shown on the Contract Plans shall be considered incidental to the work and included in the Lump Sum Bid Price.

Furnishing of all material as described in the Special Conditions, Contract Documents and as shown on the Contract Plans, unless specifically stated otherwise as supplied by MassDOT or others, necessary to complete the work shall be considered incidental to the work and included in the Lump Sum Bid Price.

Bid Price for the Rehabilitation of the Public At-Grade Crossing Located at North Main Street, Sherborn, Massachusetts – Framingham Secondary MP 17.70

Crossing Lump Sum
Price Bid Item #31 ____ (____________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

32. Allowance for Requirements of Environmental Permits

Allowance of the stipulated sum of $40,000 for permitting conditions requirements. Allowance to perform the work necessary to meet any requirements of the Conditions in the Order of Conditions to be issued by any Conservation Commission and/or the determination to be issued by the State or Federal Authority Having Jurisdiction. The Contractor will be reimbursed for the actual cost of performing the work required by the Environmental Permit(s) as determined by the Engineer up to a maximum Allowance of $40,000.

Allowance for Requirements of Environmental Permits

Allowance Price ____________**Forty-Thousand Dollars max**________ (___**$40,000.00 max**_ _).
Written in Words In Figures

Total Price Bid Item #32 _____**Forty-Thousand Dollars max**________ (___**$40,000.00 max**_ _).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

33. Allowance for Commercial Power Upgrades for Signal System

Allowance of the stipulated sum of $40,000, shall be included in Contractor’s Bid for work related to the installation of a new 100A power service close to the signal case at the locations listed below.

- South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81
- Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97
- Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25
- Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17

This allowance is for reimbursing the Contractor for cost of services, including material, equipment and labor billed by a third party (Utility Company) for the work required to provide new power service at the locations listed above.

All Contractor’s costs associated with Utility power including necessary support of Utility Company shall be included in the Bid Price.

Contractor shall submit receipted copies of itemized invoices of the Utility Company to MassDOT for payments.

Allowance for Commercial Power Upgrades for Signal System

Allowance Price ____________**Forty-Thousand Dollars max**________ (___**$40,000.00 max_**__).
Written in Words In Figures

Total Price Bid Item #33 _____**Forty-Thousand Dollars max**________(___**$40,000.00 max_**__).
Written in Words In Figures

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34. Risk Allowance

This Risk Allowance of contingency funds which is included in this Contract is to reimburse Contractor for all services, personnel, labor, materials, and equipment necessary to address unforeseen issues on the project (if required). Contractor shall include this risk allowance cost in his/her bid proposal. Contractor will be compensated with an 8% markup on actual work performed and /or subcontractors work.

The use of this allowance is solely at the discretion of MassDOT Rail and Transit and will be authorized in writing only through execution of a Risk Reallocation. All Risk Reallocations will be processed in the same manner as Change Orders. All provisions contained in the Contract applicable to Change Orders shall also apply to Risk Reallocations.

MassDOT may at any time at its sole discretion unilaterally issue a Risk Reallocation or Change Order to Contractor for any purpose relating to work under this Contract, including without limitation to address any disagreement between the parties regarding the scope or cost of the work, or whether Contractor has performed in accordance with the requirements of the Contract. A unilaterally issued Risk Reallocation or Change Order need not include a consent or acknowledgement by Contractor. Contractor shall proceed immediately as directed in the unilaterally issued Risk Reallocation or Change Order without prejudice to its rights to assert claims for additional compensation or time.

Payment for work will be based upon Time & Material costs utilizing Contractor load rates for the actual work performed. Contractor shall submit receipted copies of itemized invoices for such work to MassDOT for payments. Once the Risk Reallocation or Change Order is approved Contractor will be able to invoice against the Risk Allowance Bid Item.

(**Note – Total Contractor markups related to the work performed under this bid item are not to exceed 8%**)

Risk Allowance.

Allowance Price _**Five-Hundred-Seventy-Five-Thousand Dollars max**_ (_**$575,000.00 max**_).
Written in Words In Figures

Total Price
Bid Item #34 ___**Five-Hundred-Seventy-Five-Thousand Dollars max**_ (_**$575,000.00 max**_).
Written in Words In Figures

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35. Mobilization / Demobilization

Bid Price for all mobilization and demobilization of equipment, material and labor resources as required to perform the Project in accordance with the Contract Plans, Scope of Work, Technical Specifications, Special Conditions, MassDOT MW-1 and AREMA Standards. Bid Price to include demobilization of all Contractor resources upon completion of the Work.

(**Note – Total mobilization/demobilization price must be less than 5% of the Contract Total Price**)

Mobilization/Demobilization.

Lump Sum Price Bid Item #35 ________________________________ (__________________).
Written in Words In Figures

(Remainder of Page Intentionally Left Blank)

The Total Amount of Bid based upon the Contract Documents and proposed Bid Items Unit Prices; Lump Sum Amounts; and Allowances is:

TOTAL AMOUNT OF BID ____
(Summation of Bid Items 1 –35) Written in Words

TOTAL AMOUNT OF BID ____
(Summation of Bid Items 1 – 35) Written in Figures

By submitting this Bid, Bidder specifically acknowledges that:

(1) The quantities shown on this Bid Form are estimates only and will be used to determine the Total Amount Bid.

(2) Railroad reserves the right to reject any and all bids, or any bid item, to advertise for new proposals for the project, to waive technicalities as to form, or to proceed to do the work otherwise, as may be deemed in the best interest of Railroad and Owner. Nothing herein shall be construed as depriving Railroad of the right to reject any bid when such bid does not fully comply with the specifications for the project or the applicable bidding laws and regulations, or if Bidder is otherwise not qualified or eligible to receive award of the contract. A bid will be considered irregular and will be rejected if it is determined that any of the unit prices are materially unbalanced to the detriment of Railroad or Owner. Bidder will be required to justify in writing the price or prices bid for the work in question before Railroad determines whether to award the contract or reject the bid.

(3) The Bidder is prequalified by the MBTA in Class 1 – General Transit Construction and/or Class 3 – Trackwork and Class 6A2 – Railroad Signals and Communications for a $7.2 million contract value. Subcontractors are to be submitted for approval by MassDOT.

(4) Subject to the reservations contained in the preceding paragraphs, the contract shall be awarded to the lowest responsible and eligible bidder. The "lowest responsible and eligible bidder" shall mean Bidder who submits a complete bid in accordance with the requirements of the Bid Documents, and whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work.

(5) The Bid shall remain effective for a period of not less than sixty (60) days.

Bid submitted by ____
Name of Bidder

Signed by ________________________________ ____________________
Duly Authorized Representative of Bidder Date

Required Documents to be Submitted by Bidder

The Contractor bidding on this project must be experienced in construction projects involving work on and around an active railroad; railroad track construction; railroad tie and switch timber replacement; raising, lining and surfacing of railroad track; and heavy civil construction work.

The following bonds, forms, certificates and additional documents must be provided and/or completed and submitted as part of this Bid Form and Contractor's Bid Package:

A. Bonds

1. Completed Bid Bond in the amount of 5% of the Total Bid Price

B. Forms and Certifications

1. Certificate of Non-Collusion
2. Certificate of Independent Price Determination
3. Certificate of Compliance with Massachusetts Employment Security Law
4. Certification of Work in Harmony and OSHA Training
5. Affidavit of Compliance; Out of State Certificate
6. Vote of Corporation; Authorized Signatory
7. Executive Order 481 – Certification
8. Certificate Regarding Wage Rates; Statement of Compliance
9. Bidders' current MBTA Prequalification Certificate for Class 1 – General Transit Construction and/or Class 3 – Trackwork and Class 6A2 – Railroad Signals and Communications

C. Additional Documents

1. Preliminary Construction Schedule, including key benchmarks.
2. Approved Drug and Alcohol testing plan in compliance with all statutes and regulations administered by the Federal Railroad Administration (FRA) in implementing the required 49 CFR Part 219 Drug and Alcohol Program.
3. List of Equipment which will be used in the performance of the Work on the Grade Crossing Rehabilitation Project. Please include the following information:
    - Type of Equipment
    - Manufacturer
    - Model
    - Approximate Year
    - Approximate Hours
    - Operator Requirements

4. List of all work performed within the last three (3) years of similar size and scope, demonstrating Bidder's experience and ability to perform the work required for this project as identified in the Notice to Bidders and Project Description sections of the Bid Documents. Include the following information for each project:
    - Name of Project
    - Name of Client
    - Brief description of Project
    - Estimated Construction Cost of Project
    - Project Completion Date
    - Project Completed on Time?
    - Project Completed within Budget / Bid Price?
    - Identify any claims for extra costs, change orders, etc. associated with the Project, describe the basis for same, and specify whether the changes were approved by Owner.
    - Contact name, address, telephone number and email address for Owner's project manager.
5. List of all ongoing projects. Include the following information for each project:
    - Name of Project
    - Name of Client
    - Brief Description of Project
    - Estimated Construction Cost of Project
    - Project Commencement Date
    - Project Completion Date (estimated)
6. List of at least three (3) references from projects listed as part of paragraphs C.4 and C.5 above, including the following information:
    - Name of Contractor
    - Title and Description of Project(s) Performed By Contractor
    - Name and title of each Contractor's reference(s)
    - Address of reference
    - Phone number of reference
    - Email address of reference

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

BID BOND

KNOW ALL MEN BY THESE PRESENTS: that we the undersigned,

____
(Name of Contractor)

____
(Address of Contractor)

a ____________________________________ hereinafter called Principal, and
(Corporation, Partnership, or Individual)

____
(Name of Surety)

____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

____
(Name of Owner)

____
(Address of Owner)

hereinafter called OWNER, in the penal sum of

______________________________________Dollars, ($______________________)

for payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of ________________, 20___.

WHEREAS, the Principal has submitted to __________________________ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the

____

____

____

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his or her faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other aspects perform the agreement created by the acceptance of said bid,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which OWNER may accept such BID and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

____
(Principal)

____
(Surety)

By: ____________________________________

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department’s most current list (Circular 570 as amended) and be authorized to transact business in the Commonwealth of Massachusetts.

IMPORTANT – An appropriate Power of Attorney, dated the same date as the BOND, and evidencing the authority of the Attorney-in-Fact to act on behalf of the corporation shall be attached to the BID BOND.

FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Certificate of Non-Collusion

The undersigned certifies under penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this paragraph, the word “person” shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

Signature of Authorized Signatory

Name of Company

Date

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Certificate of Independent Price Determination

A. By submission of this bid or proposal, each Bidder or offeror certifies, and in the case of a joint bid or proposal, each party thereto certifies as to its own organization, that in connection with this procurement:

   a. The process in this bid or proposal have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other Bidder or offeror or with any competitor;
   b. Unless otherwise required by law, the prices which have been quoted in this bid or proposal have not been knowingly disclosed by Bidder or offeror and will not knowingly be disclosed by Bidder offeror prior to opening, in the case of a bid, or prior to award, in the case of a proposal, directly or indirectly to any other Bidder or offeror or to any competitor; and
   c. No attempt has been made or will be made by Bidder or offeror to induce any other person or firm to submit or not to submit a bid or proposal for the purpose of restricting competition.

B. Each person signing this bid or proposal certifies that:

   a. They are the person in Bidder’s organization responsible within that organization for the decision as to the prices being bid or offered herein and that they have not participated, and will not participate, in any action contrary to (A)(1) through (A)(3) above; or
   b. He or She is not the person in Bidder’s or offeror’s organization responsible within that organization for the decision as to the prices being bid or offered herein but that he or she has been authorized in writing to act as agent for the persons responsible for such decision(s) and to certify that such persons have not participated, and will not participate, in any action contrary to (A)(1) through (A)(3) above, and as their agent does hereby so certify; and they have not participated, and will not participate, in any action contrary to (A)(1) through (A)(3) above.

(Print Name)	(Company)
(Signature)	(Date)

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Compliance with Massachusetts Employment Security Law

In accordance with the provisions of Section 19A(b) of Chapter 151A of the Massachusetts General Laws,

I, ____,
[Name & Title]

signing on behalf of ____
[Name of Company / Employer]

hereby certify that the aforementioned employer has complied with all employment security laws of the Commonwealth of Massachusetts relating to contributions and payments in lieu of contributions.

Signed under the pains and penalties of perjury this _____day of ________________ 2022.

____
Signature

____
Notary Public

____
My Commission Expires

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Certification of Work in Harmony and OSHA Safety Training

In accordance with the provisions of Massachusetts General Laws Chapter 30, Section 39S, the undersigned certifies under penalties of perjury:

(1) that the company is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work;

(2) that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and

(3) that all employees to be employed in the work subject to the company's bid have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) that is at least 10 hours in duration.

Any employee found on the worksite without documentation of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) that is at least 10 hours in duration shall be subject to immediate removal. Contractor acknowledges that any and all subcontractors performing Work of any kind in connection with the project referenced above shall be bound by the requirements of M.G.L. Ch. 30, §39S and this certification.

Authorized Signature

Print Name & Title

Company

Date

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Affidavit of Compliance; Out of State Certificate

__ Massachusetts Business Corporation __ Foreign (non-Mass.) Corporation

__ Non-Profit Corporation

I, ____, __________________________ of
[Name of Officer] [Title of Officer]

____
[Name of Company]

whose principal office is located at ____ do herby certify that the above named corporation has filed with the State Secretary of the Commonwealth of Massachusetts all certificates and Annual Reports required by Chapter 156B, Section 109 (Business Corporation), Chapter 156D, Sections 15.03 and 16.22, or by Chapter 180, Section 26A (Non-profit Corporation) of the Massachusetts General Laws.

The attached certificate from the Massachusetts Secretary of State shall serve to document the company's compliance with the foregoing requirements pertaining to foreign corporations (as applicable).

SIGNED UNDER THE PENALTIES OF PERJURY THIS ____day of ___________, 20____

____
Authorized Signature

____
Print Name & Title

____
Company

____
Date

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Vote of Corporation; Authorized Signatory

At a meeting of the Board of Directors of ____
[Name of Company]
held on the ________day of ________________ 20___, at which all the Directors were present or waived

notice, it was VOTED, that, ____, who is the duly
[Name of Officer]

elected __________________________of this company be and hereby is authorized to execute contracts,
[Title of Officer]
bonds and other instruments in the name of and behalf of said company and affix its corporate seal

thereto; and such execution by said _____________________________________ of any contract or other
[Name of Officer]
instrument or obligation in this company's name and on its behalf by such _________________________
[Title of Officer]
of the company under seal, shall be valid and binding upon this company.

A True Copy Attest:

Clerk ________________________________
[Signature]

____
[Print Name &Title]

____
[Business Address]

____
[Date]

I, ______________________________, hereby certify that I am the Clerk of ________________________
[Name of Clerk] [Name of Company]

and that ______________________________ is the duly elected _________________________________
[Name of Officer] [Title of Officer]
of said company, and that the above vote has not been amended or rescinded and remains in full force and effect as of this date.

____
Clerk [Corporate Seal]

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Executive Order 481

INSTRUCTIONS

Executive Order 481 applies to all state agencies in the Executive Branch, including all executive offices, boards, commissions, agencies, departments, divisions, councils, bureaus, and offices, now existing and hereafter established. As it is the policy of the Executive Branch to prohibit the use of undocumented workers in connection with the performance of state contracts, all contracts entered into after February 23, 2007 require that contractors, as a condition of receiving Commonwealth funds under any Executive Branch contract, make the following certification:

CONTRACTOR CERTIFICATION

As evidenced by the signature of the Contractor's Authorized Signatory below, the Contractor certifies under the pains and penalties of perjury that the Contractor shall not knowingly use undocumented workers in connection with the performance of all Executive Branch contracts; that pursuant to federal requirements, the Contractor shall verify the immigration status of all workers assigned to such contracts without engaging in unlawful discrimination; and that the Contractor shall not knowingly or recklessly alter, falsify, or accept altered or falsified documents from any such worker(s). The Contractor understands and agrees that breach of any of these terms during the period of each contract may be regarded as a material breach, subjecting the Contractor to sanctions, including but not limited to monetary penalties, withholding of payments, contract suspension or termination.

______________________________	____________________
Contractor Authorizing Signature	Date
______________________________	
Print Name	
______________________________	
Title	
______________________________	____________________
Email	Telephone

The Contractor is required to sign this Certification only once and may provide a copy of the signed Certification for any contract executed with an Executive Branch Department. A copy of this signed Certification must be attached to the "record copy" of all contracts with this Contractor that are filed with the contracting Department.

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Wage Rates

In accordance with the provisions of Massachusetts General Laws, Chapter 30, Section 39M and Chapter 149, Sections 26 to 27H, the undersigned certifies under penalties of perjury, that

____
Name of Company

shall comply with prevailing wage requirements as set forth in M.G.L. Chapter 149, Sections 26 to 27H.

Further, the undersigned acknowledges that he / she has read and understands the additional information pertaining to these requirements provided below, including the prevailing wage sheets, payroll certification statements, and payroll certification forms.

____
Authorized Signature

____
Print Name & Title

____
Company

____
Date

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COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

The Contractor's attention is directed to Massachusetts General Laws, Chapter 149, Sections 26 through 27H, and 150A. This contract is considered to fall within the ambit of that law, which provides that in general, the Prevailing Rate or Total Rate must be paid to employees working on projects funded by the Commonwealth of Massachusetts or any political subdivision including Massachusetts Department of Transportation (MassDOT).

A Federal Aid project is also subject to the Federal Minimum Wage Rate law for construction. When comparing a state minimum wage rate, monitored by the Massachusetts Attorney General, versus federal minimum wage rate, monitored by the U.S. Department of Labor Wage and Hour Division, for a particular job classification the higher wage is at all times to be paid to the affected employee.

Every contractor or subcontractor engaged in this contract to which sections twenty-seven and twenty-seven A apply will keep a true and accurate record of all mechanics and apprentices, teamsters, chauffeurs and laborers employed thereon, showing the name, address and occupational classification of each such employee on this contract, and the hours worked by, and the wages paid to, each such employee, and shall furnish to the MassDOT's Resident Engineer, on a weekly basis, a copy of said record, in a form approved by MassDOT and in accordance with M.G.L. c. 149, § 27B, signed by the employer or his/her authorized agent under the penalties of perjury.

Each such contractor or subcontractor shall preserve its payroll records for a period of three years from the date of completion of the contract.

The Prevailing Wage Rate generally includes the following:

> Minimum Hourly Wage + Employer Contributions to Benefit Plans = Prevailing Wage Rate or Total Rate
>
> Any employer who does not make contributions to Benefit Plans must pay the total Prevailing Wage Rate directly to the employee.

Any deduction from the Prevailing Wage Rate or Total Rate for contributions to benefit plans can only be for a Health & Welfare, Pension, or Supplementary Unemployment plan meeting the requirements of the Employee Retirement Income Security Act (ERISA) of 1974. The maximum allowable deduction for these benefits from the prevailing wage rate cannot be greater than the amount allowed by Executive Office of Labor (EOL) for the specified benefits. Any additional expense of providing benefits to the employees is to be borne by the employer and cannot be deducted from the Minimum Hourly Wage. If the employer's benefit expense is less than that so provided by EOL the difference will be paid directly to the employee. The rate established must be paid to all employees who perform work on the project.

When an employer makes deductions from the Minimum Hourly Wage for an employee's contribution to social security, state taxes, federal taxes, and/or other contribution programs, allowed by law, the employer shall furnish each employee a suitable pay slip, check stub or envelope notifying the employee of the amount of the deductions.

No contractor or subcontractor contracting for any part of the contract week shall require or permit any laborer or mechanic to be employed on such work in excess of forty hours in any workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of forty hours in such workweek, whichever is the greater number of overtime hours.

Apprentice Rates are permitted only when there is an Apprentice Agreement registered with the Massachusetts Division of Apprentice Training in accordance with M.G.L. c. 23, § 11E-11L.

The Prevailing Wage Rates issued for each project shall be the rates paid for the entire project. The Prevailing Wage Rates must be posted on the job site at all times and be visible from a public way.

In addition, each such contractor and subcontractor shall furnish to the MassDOT's Resident Engineer, within fifteen days after completion of its portion of the work, a statement, executed by the contractor or subcontractor or by any authorized officer or employee of the contractor or subcontractor who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

Date: ___________________

I , ____do hereby state:
(Name of signatory party) (Title)

That I pay or supervise the payment of the persons employed by:

____
(Contractor or Subcontractor)

on the ____
(MassDOT Project Location and Contract Number)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty-nine of the General Laws.

Signature ____

Title ____

The above-mentioned copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to the MassDOT's Resident Engineer for such inspection and copying.

Massachusetts General Laws c. 149, §27, requires annual updates to prevailing wage schedules for all public construction contracts lasting longer than one year. MassDOT will request the required updates and furnish them to the Contractor. The Contractor is required to pay no less than the wage rates indicated on the annual updated wage schedules.

MassDOT will request the updates no later that two week before the anniversary of the Notice to Proceed date of the contract to allow for adequate processing by the Department of Labor Standards (DLS). The effective date for the new rates will be the anniversary date of the contract (i.e. the notice to proceed date), regardless of the date of issuance on the schedule from DLS.

All bidders are cautioned that the aforementioned laws require that employers pay to covered employees no less than the applicable minimum wages. In addition, the same laws require that the applicable prevailing wages become incorporated as part of this contract. The prevailing minimum wage law establishes serious civil and criminal penalties for violations, including imprisonment and exclusion from future public contracts. Bidders are cautioned to carefully read the relevant sections of the Massachusetts General Laws.

*** END OF DOCUMENT ***

FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Wage Rates Statement of Compliance

Date: ____________________

I, ____, do hereby state:
(Name of signatory) (Title)

that I pay or supervise the payment of the persons employed by:

____ pertaining to
(Contractor or Subcontractor)

____
(Project Location and Contract Number)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty-nine of the General Laws.

____
Authorized Signature

____
Print Name & Title

____
Company

____
Date

The above-referenced copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to MassDOT's Rail and Transit Division for such inspection.

Massachusetts General Laws c. 149, §27, requires annual updates to prevailing wage schedules for all public construction contracts lasting longer than one year. MassDOT will request the required updates and furnish them to Contractor. Contractor is required to pay no less than the wage rates indicated on the annual updated wage schedules.

MassDOT will request the updates no later than two (2) weeks before the anniversary of the Notice to Proceed date of the contract to allow for adequate processing by the Division of Occupational Safety (DOS). The effective date for the new rates will be the anniversary date of the contract (i.e. the notice to proceed date), regardless of the date of issuance on the schedule from DOS.

All Bidders and Contractors are cautioned that the aforementioned laws require that employers pay to covered employees no less than the applicable minimum wages. In addition, the same laws require that the applicable prevailing wages become incorporated as part of this contract. The prevailing minimum wage law establishes serious civil and criminal penalties for violations, including imprisonment and exclusion from future public contracts. Bidders and contractors are cautioned to carefully read the relevant sections of the Massachusetts General Laws (most recently amended August, 2008).

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Additional Required Documents to be Submitted by Apparent Successful Bidder

The Apparent Successful Bidder will be required to provide and/or complete and submit additional documents after notification of successful bid in order to execute the Contract. The additional required documents include, but are not limited to, the following:

A. Bonds
  1. Completed Performance Bond in the amount of 100% of the Contract Price
    - Form is attached
  2. Completed Payment Bond in the amount of 100% of the Contract Price
    - Form is attached

B. Forms and Certifications
  1. Certificate of State Tax Compliance
    - Form is attached
  2. Insurance / Surety Powers of Attorney
  3. Insurer's Affidavit for Worker's Compensation
  4. Certification of Construction Equipment Standard Compliance
  5. Diesel Construction Equipment Data Sheet
    - List and certify all large non-road diesel construction equipment (greater than 50 HP) used on this Contract

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FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

____

(Name of Contractor)

____

(Address of Contractor)

a ________________________________ hereinafter called Principal, and

(Corporation, Partnership, or Individual)

____

(Name of Surety)

____

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

____

(Name of Owner)

____

(Address of Owner)

hereinafter called OWNER, in the penal sum of

________________________________ Dollars, ($________________________)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal entered into a certain contract with OWNER, dated the

______ day of ________________, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

____

____

____

NOW, THEREFORE, the condition of this obligation is such that, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extension thereof which may be granted by OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless OWNER and/or RAILROAD from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay OWNER all outlay and expense which OWNER and/or RAILROAD may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between OWNER and CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in ____________________ counterparts, each one
(Number)
of which shall be deemed an original, this the _____ day of ________________, 20____.

ATTEST:

	______________________________ (Principal)
______________________________ (Principal / Secretary)	By ______________________________
(SEAL)	
______________________________ (Witness as to Principal)	______________________________ (Address)
______________________________ (Address)	______________________________

ATTEST:

______________________________ (Surety / Secretary)	______________________________ (Surety)
(SEAL)	
______________________________ (Witness as to Surety)	By ______________________________ (Attorney-in-Fact)
______________________________ (Address)	______________________________ (Address)
______________________________	______________________________

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners shall execute BOND.

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department’s most current list (Circular 570 as amended) and be authorized to transact business in the Commonwealth of Massachusetts.

FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

____
(Name of Contractor)

____
(Address of Contractor)

a ______________________________________ hereinafter called Principal, and
(Corporation, Partnership, or Individual)

____
(Name of Surety)

____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

____
(Name of Owner)

____
(Address of Owner)

hereinafter called OWNER, in the penal sum of

______________________________ Dollars, ($____________________)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our respective heirs, executor administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal entered into a certain contract with OWNER, dated the

______ day of ________________, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

____

____

____

NOW, THEREFORE, the condition of this obligation is such that, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between OWNER and CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in ____________________ counterparts, each one
(Number)
of which shall be deemed an original, this the _____ day of ________________, 20____.

ATTEST:	______________________________
	(Principal)
______________________________	By ______________________________
(Principal / Secretary)	
(SEAL)	
______________________________	______________________________
(Witness as to Principal)	(Address)
______________________________	______________________________
(Address)	
ATTEST:	
______________________________	______________________________
(Surety / Secretary)	(Surety)
(SEAL)	
______________________________	By ______________________________
(Witness as to Surety)	(Attorney-in-Fact)
______________________________	______________________________
(Address)	(Address)
______________________________	______________________________

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners shall execute BOND.

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the Commonwealth of Massachusetts.

FY 2022 & FY2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

Certificate of State Tax Compliance

In accordance with the provisions of Chapter 62C, Section 49A (b) of the Massachusetts

General Laws, I, ____

[Name & Title]

authorized signatory for ____

[Name of Company]

which has a principal place of business at ________________________________

____

do hereby certify under the pains and penalties of perjury that ________________________

[Name of Company]

has complied with all laws of the Commonwealth of Massachusetts relating to taxes.

____

Authorized Signature

____

Print Name and Title

____

Company

____

Date

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DOCUMENT 00718

SPECIAL PROVISION FOR PARTICIPATION BY MINORITY OR WOMEN'S BUSINESS ENTERPRISES AND SERVICE- DISABLED VETERAN- OWNED BUSINESS ENTERPRISES

(Implementing Chapter 102, Section 24 and
Chapter 273, Section 124, of the Acts of 1994 and Chapter 56, Sections 1 to 5 of the Acts of 2010
and subsequent Acts)
Revised: September 27, 2021

I. PARTICIPATION

M/WBE PARTICIPATION GOAL
On this Contract, the Massachusetts Department of Transportation (MassDOT) has established a goal for participation by Minority or Women Business Enterprise(s) (M/WBE). One half of the goal shall be met in the form of contractor activity. This goal shall remain in effect throughout the life of the Contract.

☒ Design-Bid-Build Projects: M/WBE Participation Goal **6.0 %**
(*One half of this goal shall be met in the form of Subcontractor construction activity*)

☐ Design-Build Projects: M/WBE Design Participation Goal **___%** and M/WBE Construction Participation Goal **___%**
(One half of the Construction Goal shall be met in the form of Subcontractor construction activity)

SDVOBE PARTICIPATION BENCHMARK
On this Contract, the Massachusetts Department of Transportation (MassDOT) has established a goal for participation by Service- Disabled Veteran- Owned Business Enterprise(s) (SDVOBE). This goal shall remain in effect throughout the life of the Contract.

☐ Design-Bid-Build Projects: SDVOBE Participation Goal **0.0 %**

☐ Design-Build Projects: SDVOBE Design Participation Goal **___%** and SDVOBE Construction Participation Goal **___%**

II. POLICY

It is the policy of the MassDOT that Minority, Women Business Enterprises (M/WBEs) and Service- Disabled Veteran- Owned Business Enterprises (SDVOBEs) have equal opportunity to receive and participate in the performance of its state funded Contracts.

III. M/WBE and SDVOBE OBLIGATION

The Contractor agrees to take all necessary and reasonable steps to ensure that MBE, WBE, and SDVOBEs have the maximum opportunity to compete for, and to perform, Department Contracts.

IV. FAILURE TO COMPLY WITH M/WBE OR SDVOBE REQUIREMENTS

All Contractors and Subcontractors are hereby advised that failure to carry out the requirements of these Provisions constitutes a breach of Contract which may result in termination of the Contract, a determination that the Contractor or Subcontractor be barred from bidding on Department Contracts for up to three (3) years, or any other remedy as the Department may impose under Section XIV of these Special Provisions.

V. REQUIRED SUBCONTRACT PROVISIONS

The Prime Contractor shall include the Provisions of Sections II, III, and IV above in every subcontract making those provisions binding on each subcontractor, supplier, manufacturer, consultant or service provider.

VI. DEFINITIONS

For the purpose of these Special Provisions, the terms listed below are defined as follows:

Minority Business Enterprise or MBE means any individual, business organization, or non-profit corporation certified as a MBE by the Supplier Diversity Office (SDO), formerly known as the State Office of Minority and Women Business Assistance (SOMWBA), or by the Department for the purposes of a particular bid or proposal to be submitted to the Department.

Women Business Enterprise or WBE means any individual, business or organization, or non-profit corporation certified as a WBE by SDO, or by the Department for the purposes of a particular bid or proposal to be submitted to the Department.

Service- Disabled Veterans- Owned Businesses or SDVOBE means a business not less than 51 percent of which is owned by one or more service- disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and the management and daily business operations of which are controlled by one or more service- disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

"Contractor activity" means any work, including but not limited to, construction, demolition, renovation, survey, test boring services, or maintenance work performed under the Contract.

"Approved Joint Venture" means a joint venture between M/WBEs and non-M/WBEs, or SDVOBEs and non-SDVOBEs, which has been established for the purpose of participation on a particular contract, where:

1. The M/WBE or SDVOBE partner(s) shares in the ownership, control, management responsibilities, risks and profits of the joint venture; and

2. The Joint Venture has been approved by the Department for M/WBE or SDVOBE participation on the particular contract.

"Equipment Rental Firm" means a firm that owns equipment and assumes actual and contractual responsibility to rent said equipment to perform a useful function of the work of the contract consistent with normal industry practice.

"Material Supplier" means a vendor engaged in sales to the highway construction industry from an established place of business or source of supply, which:

(a) Manufactures goods from raw materials or substantially alters them before resale, or

(b) Provides and maintains a storage facility for materials used in the work, consistent with normal industry practice.

“Department” means the Massachusetts Department of Transportation (MassDOT).

"SDO" means the Massachusetts Supplier Diversity Office.

VII. ELIGIBILITY of M/WBEs

Only firms, *OTHER THAN THE PRIME CONTRACTOR*, which have been certified by SDO and/or the Department as eligible to participate on state funded contracts as MBEs or WBEs may be used on this contract for credit toward the toward the M/WBE participation goal.

1. SDO Directory of Certified M/WBEs: The Supplier Diversity Office publishes a Directory of certified MBE and WBEs. This Directory can be obtained from SDO at https://www.somwba.state.ma.us/. This site lists those firms which have been certified as minority owned (MBEs) or women owned (WBEs) in accordance with the criteria of 425 CMR 2.00 et seq to participate as M/WBEs on state funded contracts. It also lists the kinds of work in which each firm engages but does not constitute an endorsement of the quality or performance of any business and does not represent Department subcontractor approval.

2. Application for Certification by the Department for a Particular Project: A firm which has (1) submitted a fully completed M/WBE application to SDO at least 30 days previously, (2) has provided in a timely manner, any additional information which may have been requested by SDO, and (3) can provide evidence, satisfactory to the Department, of a bidder's conditional commitment to subcontract with the firm, if certified, may apply directly to the MassDOT Office of Civil Rights to be certified for participation on the particular contract.

3. Joint Venture Approval: To obtain recognition as an approved joint venture between M/WBEs and non-/M/WBEs, the Joint Venture must provide to the MassDOT Office of Civil Rights, at least 14 business days before the bid opening date, the Joint Venture Affidavit Document B00847, and a copy of the Joint Venture Agreement, which shall include a detailed breakdown of the following:

   (a) Capital participation by the M/WBE,

   (b) Specific equipment to be provided to the Joint Venture by the M/WBE,

   (c) Specific responsibilities of the M/WBE in the management of the Joint Venture,

   (d) Workforce and specific skills to be provided to the Joint Venture by the M/WBE, and

   (e) Percentage distribution to the M/WBE of the projected profit or loss incurred by the Joint Venture.

   (f) The Joint Venture shall provide all such additional information as may be requested by the Department for the purpose of determining joint venture eligibility.

VIII. ELIGIBILITY of SDVOBEs

Only firms, *OTHER THAN THE PRIME CONTRACTOR*, which have demonstrated that they are listed as a service-disabled veteran- owned small businesses within the VetBiz database may be used on this contract for credit toward the SDVOBE participation goal.

1. VetBiz Database: The website, located at www.VetBiz.gov, listing verified service- disabled veteran- owned businesses.

2. Joint Venture Approval: To obtain recognition as an approved joint venture between SDVOBEs and non-/SDVOBEs, the joint venture must provide to the MassDOT Office of Civil Rights, at least 14 business days before the bid opening date, an application for joint venture participation approval, and a copy of the Joint Venture Agreement, which shall include a detailed breakdown of the following:

   (a) Capital participation by the SDVOBE,

(b) Specific equipment to be provided to the joint venture by the SDVOBE,

(c) Specific responsibilities of the SDVOBE in the management of the Joint Venture,

(d) Workforce and specific skills to be provided to the joint venture by the SDVOBE, and

(e) Percentage distribution to the SDVOBE of the projected profit or loss incurred by the Joint Venture.

(f) The Joint Venture shall provide all such additional information as may be requested by the Department for the purpose of determining joint venture eligibility.

IX. COUNTING M/WBE PARTICIPATION AND SDVOBE BENCHMARKS TOWARDS M/WBE AND SDVOBE GOALS

In order for M/WBE participation and SDVOBE benchmarks to count toward the Contract goal, the M/WBE and SDVOBE must have independently managed, supervised and performed the Contract work with its own workforce, equipment and resources. M/WBE and SDVOBE participation which fulfills these requirements shall be counted toward meeting the M/WBE and SDVOBE goals in accordance with the following rules:

1 If a firm has been determined to be an eligible MBE, WBE or SDVOBE, the total dollar value of the contract performed by the M/WBE or SDVOBE is counted toward the applicable goal as follows:

a. Except as provided below, in Section IX (1)(g), work performed by a M/WBE or a SDVOBE Prime Contractor shall not be counted toward the M/WBE or SDVOBE goal, and all Prime Contractors, including M/WBE or SDVOBE Prime Contractors, must comply with the M/WBE and SDVOBE requirements of this Contract.

b. For a M/WBE or SDVOBE material supplier, sixty percent (60%) of the amount to be paid for materials and supplies required under this Contract shall be credited toward the goal.

c. For a M/WBE or SDVOBE who provides a bonafide service such as professional, technical, consultant or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials, or supplies required for performance of the contract, reasonable fees or commissions charged for the service shall be listed, but the cost of items themselves shall not be credited.

d. For a M/WBE or SDVOBE hauler, trucker, or delivery service, which is not also the manufacturer of or a regular dealer in the materials and supplies, reasonable fees charged for delivery of materials and supplies required on the job site shall be credited; the cost of the materials and supplies themselves shall not be credited.

e. For a M/WBE or SDVOBE who provides any bonds or insurance specifically required for the performance of the contract, reasonable fees or commissions charged for such service shall be listed, but the face amount or actual premium paid for the bond or insurance shall not be credited.

f. The Department shall determine if the fees or commissions listed in accordance with paragraphs (c), (d), and (e) are not excessive as compared with fees or commissions customarily allowed for similar services.

g. That portion of the contract total dollar value equal to the percentage of ownership and control of the M/WBE partner(s) or SDVOBE partner(s) in an approved Joint Venture shall be counted toward the Contract goal, except that credit for M/WBE and SDVOBE participation in an approved Prime Joint Venture shall not exceed one half of the Contract goal.

X. JOINT CHECK POLICY

1. MassDOT recognizes that the use of joint checks may be a business practice required by material suppliers and vendors in the construction industry. A joint check is a two-party check issued by a/the Prime Contractor to a M/WBE or SDVOBE third party such as a regular dealer of material or supplies. The Prime Contractor issues the check as payor to the M/WBE or SDVOBE and the third party jointly as payees to guarantee payment to the third party for materials or supplies obtained or to be used by the M/WBE or SDVOBE. MassDOT has established criteria to ensure that M/WBEs or SDVOBEs are in fact performing a commercially useful function ("CUF") while using a joint check arrangement. Contractors and M/WBEs or SDVOBEs must meet and conform to these conditions and criteria governing the use of joint checks.

2. In the event that a Contractor, M/WBE or SDVOBE Subcontractor desires to a use joint check, MassDOT will require prior notice and will closely monitor the arrangement for compliance. MassDOT may allow a joint check arrangement and give credit to a Contractor for use of the M/WBE or SDVOBE where one or more of the following conditions exist:

   - The use of a joint check is in fact required by this type of vendor or supplier as a standard industry practice that applies to all Contractors (M/WBEs, SDVOBE and non-M/WBEs or non-SDVOBEs); or is required by a specific vendor or supplier;

   - Payment for supplies or materials would be delayed for an unreasonably extended period without the joint check arrangement;

   - The M/WBE or SDVOBE (or any of its Subcontractors) has a pattern or history of not paying a vendor or supplier within a reasonable time or has not established enough of a credit history with the supplier or vendor; and/or

   - The presence of severe adverse economic conditions, where credit resources may be limited and such practices may be necessary or required to effect timely payments.

3. Other factors MassDOT may consider:

   - Whether there is a requirement by the Prime Contractor that a M/WBE or SDVOBE should use a specific vendor or supplier to meet their Subcontractor specifications;

   - Whether there is a requirement that a M/WBE or SDVOBE use the Prime Contractor's negotiated price;

   - The independence of the M/WBE or SDVOBE;

   - Whether approval has been sought prior to use of a joint check arrangement; and

   - Whether any approved joint check arrangement has exceeded a reasonable period of use;

   - The operation of the joint check arrangement; and

   - Whether the M/WBE or SDVOBE has made an effort to establish alternate arrangements for following periods (i.e., the M/WBE or SDVOBE must show it can, or has, or why it has not, established or increased a credit line with the vendor or supplier).

Even with the use of a Joint Check, both the Contractor and M/WBE or SDVOBE remain responsible for compliance with all other elements of the Special Provisions, and must still be able to prove that a commercially useful function is being performed for the Contractor.

XI. JOINT CHECK PROCEDURES

- The M/WBE or SDVOBE advises its General or Prime Contractor that it will have to use a Joint Check and provide proof of such requirement.
- The General or the Prime Contractor submits a request for approval to MassDOT, using MassDOT's approved Joint Check Request form (Document B00846) and by notification on the M/WBE Letter of Intent (Document B00843) or SDVOBE Letter of Intent (Document B00845), and any other relevant documents. Requests that are not initiated during the bid process should be made in writing and comply with the procedure.
- The Contractor and M/WBE or SDVOBE must have:
  - (a) a written agreement with the material supplier/vendor;
  - (b) applied for credit with the subject material supplier and has supplied the vendor's response;
  - (c) shown that it will place all orders to the subject material supplier/vendor;
  - (d) made and retains all decision-making responsibilities concerning the materials; and
  - (e) provided a Joint Check Agreement that is acceptable to MassDOT;
- The MassDOT Office of Civil Rights will review the request and render a decision as part of the approval process for M/WBE or SDVOBE Schedules and Letters of Intent.
- Review and Approval will be project specific and relevant documents will be made part of the Project Contract file.
- Payments should be made in the name of both the M/WBE or SDVOBE and vendor or supplier. Payments should be issued and signed by the Contractor as only the guarantor for prompt payment of purchases to the vendor or supplier. The payment to the vendor or supplier should be handled by the M/WBE or SDVOBE (i.e. if possible, funds or the joint check should be processed by the M/WBE or SDVOBE and sent by the M/WBE or SDVOBE to the vendor or supplier).
- MassDOT may request copies of cancelled checks (front and back) and transmittal information to verify any payments made to the M/WBE or SDVOBE and vendor or supplier.
- MassDOT may request other information and documents, and may ask questions of the Contractor, Subcontractor and vendor or supplier prior to, during, and after the project performance to ascertain whether the Subcontractor is performing a commercially useful function and all parties are complying with M/WBE or SDVOBE Program policies and procedures as part of the Subcontractor approval process.

XII. AWARD DOCUMENTATION AND PROCEDURES

1. The two lowest bidders/the two bidders with the lowest price per quality score point, including any M/WBE bidder or SDVOBE bidder, shall submit, by the close of business on the third business day after the bid opening, a completed Schedule of M/WBE and SDVOBE participation, in the form attached, which shall list:

   a. The full company name, address and telephone number of each M/WBE or SDVOBE with whom the bidder intends to make a commitment;

   b. The Contract item(s), by number(s) and quantity(ies), if applicable, or specific description of other business activity to be performed by each M/WBE or SDVOBE as set forth in the Letters of Intent. The bidder shall list only firms which have the capacity to perform, manage and supervise the work proposed in accordance with the requirements of Section XII of these Special Provisions.

   c. The total dollar amount to be paid to each M/WBE or SDVOBE. (Bidders are cautioned that at least one half of the participation goal must be met with Contract work.)

   d. The total dollar amount to be paid to each M/WBE or SDVOBE which is eligible for credit toward the M/WBE or SDVOBE goal under the crediting rules set out in Section IX.

e. The total creditable M/WBE or SDVOBE participation as a percentage of the total bid price.

2. All firms listed on the Schedule must be currently certified.

3. The two lowest bidders/the two bidders with the lowest price per quality score point shall submit with their Schedules of Participation, fully completed, signed Letters of Intent from each of the M/WBEs or SDVOBEs listed on the Schedule. The Letters of Intent shall be in the form attached and shall identify specifically the contract activity the M/WBE or SDVOBE proposes to perform, expressed as contract item number, if applicable, description of the activity, quantity, unit price and total price. In the event of discrepancy between the Schedule and the Letter of Intent, the Letter of Intent shall govern.

4. Evidence of good faith efforts will be evaluated by the Department in the selection of the lowest responsible bidder/best value bidder. All information requested by the Department for the purpose of evaluating the bidder's efforts to achieve the goal must be provided within three calendar days and must be accurate and complete in every detail. The apparent low bidder's/best value bidder’s attainment of the M/WBE or SDVOBE goal or a satisfactory demonstration of good faith efforts is a prerequisite for Award of the Contract.

5. Failure to meet, or to demonstrate good faith efforts to meet, the requirements of these Special Provisions shall render a bid non-responsive. Therefore, in order to be eligible for award, the bidder (1) must list on the Schedule of Participation, and provide the required Letters of Intent for, M/WBE or SDVOBE participation which meets or exceeds the Contract goal in accordance with the terms of these Special Provisions or (2) must demonstrate, to the satisfaction of the Department, that good faith efforts were made to achieve the goal.

6. If the Department finds that the percentage of M/WBE or SDVOBE participation submitted by the bidder on its Schedule does not meet the Contract goal, or that the Letters of Intent were not timely filed, and that the bidder has not demonstrated good faith efforts to comply with these requirements, it shall propose that the bidder be declared ineligible for Award. In that case, the bidder may request administrative reconsideration. Such requests must be sent in writing within three calendar days of receiving notice of proposed ineligibility to: The Office of the General Counsel, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA, 02116.

7. If, after administrative reconsideration, the Department finds that the bidder has not shown that sufficient good faith efforts were made to comply with the requirements of these Special Provisions it shall reject the bidder’s proposal and may retain the proposal guaranty.

8. Actions which constitute evidence of good faith efforts to meet the M/WBE or SDVOBE goals include, but are not limited to, all of the following examples:

   a. Efforts made to select portions of the work proposed to be performed by M/WBEs or SDVOBEs in order to increase the likelihood of achieving the stated goal, including, where appropriate, but not limited to, breaking down contracts into economically feasible units to facilitate M/WBE and SDVOBE participation. The value of such work is required to at least equal the M/WBE and SDVOBE goal.

   b. Reasonable written notification prior to the opening of bids soliciting individual M/WBEs or SDVOBEs interested in participation in the contract as subcontractors, regular dealers, manufacturers, consultants, or service providers and identifying the specific items or type of work being solicited.

   c. Written notification to M/WBE or SDVOBE economic development assistance agencies and organizations which provide assistance in recruitment and placement of M/WBEs and SDVOBEs, describing the type of work, supplies or services being considered for M/WBE or SDVOBE subcontracting on this contract.

   d. Efforts made to negotiate with M/WBEs or SDVOBEs for specific items of work including evidence of:
      (1) The names, addresses, telephone numbers of M/WBEs or SDVOBEs who were contacted, the dates of initial contact and whether initial solicitations of interest were followed up by contacts with M/WBEs or SDVOBEs to determine with certainty whether the M/WBEs or SDVOBEs were interested. Personal or

phone contacts are expected.

(2) A description of the information provided by the M/WBEs or SDVOBEs regarding the plans and specifications and estimated quantities for portions of the work to be performed.

(3) A statement of why additional agreements with M/WBEs or SDVOBEs were not reached.

(4) Documentation of each M/WBE or SDVOBE contacted but rejected and the reasons for the rejection.

e. Absence of any agreements between the Contractor and the M/WBE or SDVOBE in which M/WBE or SDVOBE promises not to provide subcontracting quotations to other bidders.

f. Efforts made to assist the M/WBEs or SDVOBEs that need assistance in obtaining bonding, insurance, or lines of credit required by the Contractor.

g. Documentation that qualified M/WBEs or SDVOBEs are not available, or are not interested.

h. Attendance at any meeting scheduled by the Department to encourage better Contractor-M/WBE or Contractor- SDVOBE relationships and/or to inform M/WBEs or SDVOBEs of forthcoming M/WBE or SDVOBE utilization opportunities.

i. Advertisement, in general circulation media, in trade association publications and in disadvantaged business enterprise-focused media, of interest in utilizing M/WBEs or SDVOBEs and the area of interest.

j. Efforts to effectively use the services of available minority community organizations; women organizations, veteran organizations, minority, women disadvantaged and veteran contractor's groups; local, state and federal disadvantaged business assistance offices; and other organizations that provide assistance in recruitment and placement of M/WBEs or SDVOBEs.

9. The demonstration of good faith efforts must establish that the Contractor has actively and aggressively sought out M/WBEs or SDVOBEs to participate in the project and has taken all actions which could be reasonably expected to achieve the goal. Examples of circumstances or actions not acceptable as reasons for failure to meet the M/WBE or SDVOBE goal, include, but are not limited to:

   a. The M/WBE or SDVOBE was unable to provide performance and/or payment bonds.

   b. The M/WBEs or SDVOBEs commercially reasonable bid was rejected based on price.

   c. The M/WBE or SDVOBE would not agree to perform items of work at the unit bid price.

   d The Contractor does not want to subcontract a percentage of the work sufficient to meet the goal.

   e. Solicitation by mail or fax only.

XIII. COMPLIANCE

1. All activity performed by a M/WBE or SDVOBE for credit toward the Contract goal must be performed, managed and supervised by the M/WBE or SDVOBE. Prime Contractor shall not enter into, or condone, any other arrangement.

2. The Prime Contractor shall not perform with its own organization, or assign to any other business, any activity designated for the M/WBEs or SDVOBEs named on the Schedule submitted by the Prime Contractor under Section IX, or under Section XII(6), without the approval of the Department in accordance with the requirements of Sections XIII(6) and XIII(10).

3. The Department may suspend payment for any activity which was not performed by the M/WBE or SDVOBE to whom the activity was committed on the approved Schedule of Participation, or which was not performed in accordance with the requirements of Section XIII(1).

4. The Department retains the right to approve or disapprove all subcontractors. Requests by the Prime Contractor for approval of participation by a M/WBE or SDVOBE subcontractor for credit toward the Contract goal must include, in addition to any other requirements for subcontractor approval, the following:

    a. A copy of the proposed subcontract. The subcontract must be for at least the dollar amount, and for the work described, in the Prime Contractor's Schedule of Participation.

    b. A resume stating the qualifications and experience of the M/WBE or SDVOBE superintendent and/or foreperson who will supervise the on-site work. A new resume will be required for any change in supervisory personnel during the progress of the work.

    c. A Schedule of Operations indicating when the M/WBE or SDVOBE is expected to perform the work.

    d. A list of (1) equipment owned by the M/WBE or SDVOBE to be used on the Project, and (2) equipment to be leased by the M/WBE or SDVOBE for use on the Project.

    e. A list of: (1) all projects (public and private) which the M/WBE or SDVOBE is currently performing, (2) all projects (public and private) to which the M/WBE or SDVOBE is committed, (3) all projects (public and private) to which the M/WBE or SDVOBE intends to make a commitment. For each contract, list the contracting organization, the name and telephone number of a contact person for the contracting organization, the dollar value of the work, a description of the work, and the M/WBEs or SDVOBEs work schedule for each project.

5. If, pursuant to the subcontractor approval process, the Department finds that a M/WBE or SDVOBE subcontractor does not have sufficient experience or resources to perform, manage and supervise work of the kind proposed in accordance with the requirements of Section XIII(1), approval of the M/WBE or SDVOBE subcontractor may be denied. In the event of such denial, the Prime Contractor shall proceed in accordance with the requirements of Sections XIII(6) and XIII(10).

6. If, for reasons beyond its control, the Prime Contractor cannot comply with its M/WBE or SDVOBE commitment in accordance with the Schedule of participation submitted under Section IX and the terms of these Special Provisions, the Prime Contractor shall submit to the Department the reasons for its inability to comply with its obligations under Section I and shall submit, and request approval for, a revised Schedule of Participation. If approved by the Department, the revised Schedule shall govern the Prime Contractor's performance in meeting its obligations under these special provisions.

7. A Prime Contractor's compliance with the participation goal in Section I shall be determined by reference to the required percentage of the total Contract price, including any additions and modifications thereto, provided, however, that no decrease in the dollar amount of a bidder's commitment to any M/WBE or SDVOBE shall be allowed without the approval of the Department.

8. If the Contract amount is increased, the Prime Contractor shall submit a revised Schedule of Participation in accordance with Sections XIII(6) and XIII(10).

9. In the event of the decertification of a M/WBE or SDVOBE participating or scheduled to participate on the contract for credit toward the goal, the Contractor shall proceed in accordance with Sections XIII(6) and XIII(10).

10. The Prime Contractor shall notify the Department immediately of any facts which come to its attention indicating that it may or will be unable to comply with any aspect of its M/WBE or SDVOBE obligation under this Contract.

11. Any notice required by these Special Provisions shall be given in writing to the Resident Engineer and the district designated Compliance Officer with a copy to the Director of Compliance, Office of Diversity and Civil Rights, 10 Park Plaza, Room 3170, Boston MA 02116.

12. The Prime Contractor and its subcontractors shall comply with the Department's Electronic Reporting System Requirements (Contract Document 00821) and submit all information required by the Department related to the M/WBE Special Provisions and SDVOBE Special Provisions through the Equitable Business Opportunity Solution (EBO). The Department reserves the right to request reports in the format it deems necessary anytime during the performance of the Contract.

13. The Contractor shall pay each M/WBE or SDVOBE for satisfactory performance of its Contract no later than 10 days from receipt of payment for the work from the Department. Any delay or postponement of payment to the M/WBEs or SDVOBEs must be for good cause and only with the prior approval of the Department.

14. The Department may withhold the Contractor's next periodic payment if each M/WBE or SDVOBE is not paid in accordance with Section XIII(13).

15. The Department may require specific performance of the Prime Contractor's commitment under the Contract by requiring the Prime Contractor to subcontract with a M/WBE or SDVOBE for any contract or specialty item.

XIV. SANCTIONS

If the Prime Contractor does not comply with the terms of these Special Provisions and cannot demonstrate to the satisfaction of the Department that good faith efforts were made to achieve such compliance, the Department may, in addition to any other remedy provided for in the Contract, and notwithstanding any other provision in the Contract:

1. Retain, in connection with final acceptance and final payment, an amount determined by multiplying the total contract amount by the percentage in Section I, less the amount paid to approved M/WBEs or SDVOBEs for work performed under the Contract in accordance with the provisions of Section X. The Prime Contractor shall have the right to appeal such retention of funds in accordance with the provisions of M.G.L. c. 30A s.10.

2. Suspend, terminate or cancel this Contract, in whole or in part, and call upon the Prime Contractor's surety to perform all terms and conditions in the Contract.

3. In accordance with 720 CMR 5.05(1)(f), modify or revoke the Prime Contractor's Prequalification status or recommend that the Prime Contractor not receive award of a pending Contract. The Prime Contractor may appeal the determination of the Prequalification Committee in accordance with the provisions of 720 CMR 5.07.

4. Initiate debarment proceedings under M.G.L. c.29 §29F.

XV. FURTHER INFORMATION

Any proposed M/WBE, SDVOBE, bidder, Contractor or subcontractor shall provide such information as is necessary in the judgement of the Department to ascertain its compliance with the terms of this Special Provision.

XVI. LIST OF ADDITIONAL DOCUMENTS

1. The following documents shall be completed and signed by the bidder and designated M/WBEs or SDVOBEs in accordance with Section XII - Award Documentation and Procedures. These documents must be returned by the bidder to MassDOT's Bid Document Distribution Center:

   ☐ Schedule of M/WBEs (Document B00842) or SDVOBE Participation (Document B00844)
   ☐ Letter of Intent: M/WBEs (Document B00843) or SDVOBE (Document B00845)

☐ M/WBEs or SDVOBE Joint Check Arrangement Approval Form (Document B00846), if Contractor and M/WBE or SDVOBE plan, or if M/WBE or SDVOBE is required to use a Joint Check (when applicable)

2. The following document shall be signed and returned by Contractor and Subcontractors/M/WBEs or SDVOBEs to the MassDOT District Office overseeing the Project, as applicable:

   ☐ Contractor/Subcontractor Certification Form (Document No. 00859) (a checklist of other documents to be included with every subcontract (M/WBEs or SDVOBEs and non-M/WBEs or SDVOBEs alike)).

3. The following document shall be provided to MassDOT's Office of Civil Rights and Prequalification Office at least fourteen (14) business days before the bid opening date:

   ☐ Joint Venture Affidavit of M/WBE or SDVOBE/Non-M/WBE or Non-SDVOBE (Document B00847)

4. The following document shall be provided to MassDOT's District Office of Civil Rights within 30 calendar days after the work of the DBE is completed, or no later than 30 calendar days after the work of the DBE is on a completed and processed CQE. This document shall be completed and submitted by the Prime Contractor:

   ☐ Certificate of Completion by a Minority/Women or Disadvantaged Business Enterprise (M/W/DBE) (Form No. CSD-100)

** END OF DOCUMENT ***

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

MBE OR WBE LETTER OF INTENT DOCUMENTS B00842 AND B00843

DOCUMENT B00842

SCHEDULE OF PARTICIPATION BY MINORITY OR WOMEN BUSINESS ENTERPRISES (M/WBE)

MASSDOT PROJECT NUMBER: CIP #1.3, #3.3, #9.3.1, #9.3.2, #10.3.1 and #10.3.3

PROJECT LOCATION: Barnstable, Bourne, Norton, Taunton, Foxborough, Medfield, and Sherborn, MA

DATE OF BID OPENING: May 26, 2022, 2:00 p.m.

NAME OF PRIME BIDDER: ______________________________

Name Address and Phone Number of M/WBE	Name of Activity	(a) M/WBE Contractor Activity Amount	(b) M/WBE Other Business Amount	(c) Total amount eligible for credit under rules in Section VIII of the Special Provisions
Total Bid Amount $	TOTALS:	$	$	$
	M/WBE Percentage of Total bid:	%	%	%

Column (a) must be at least one-half of the M/WBE percentage goal.

SIGNATURE: ______________________ Date: ____________ Tel No: ________________

NAME AND TITLE (PRINT):______________________________________

BIDDERS ARE CAUTIONED TO REVIEW DOCUMENT 00718 -- SPECIAL PROVISION FOR PARTICIPATION BY MINORITY OR WOMEN BUSINESS ENTERPRISES AND SERVICE-DISABLED VETERAN OWNED BUSINESS ENTERPRISES.

*** END OF DOCUMENT ***

DOCUMENT B00843

MINORITY OR WOMEN'S BUSINESS ENTERPRISE PARTICIPATION LETTER OF INTENT

PAGE 1 OF 2

MASSDOT PROJECT NUMBER: CIP #1.3, #3.3, #9.3.1, #9.3.2, #10.3.1 and #10.3.3

PROJECT LOCATION: Barnstable, Bourne, Norton, Taunton, Foxborough, Medfield, and Sherborn, MA

DATE OF BID OPENING: May 26, 2022, 2:00 p.m.

FROM ______________________________

(Minority or Women's Business Enterprise Company)

TO: ______________________________

(Name of Prime Contractor)

1. My company is currently certified as an MBE or WBE by the Massachusetts Supplier Diversity Office, formerly known as the State Office of Minority and Women Business Assistance (SOMWBA). There have been no changes affecting the ownership, control or independence of my company since my last certification review.

2. If any such change occurs prior to my company's completion of this proposed work, I will give written notification to your firm and to the Massachusetts Department of Transportation (MassDOT).

3. (For contractor activity only.) My firm will provide to you, upon request, for the purpose of obtaining subcontractor approval from MassDOT; (1) a resume stating the qualifications and experience of the superintendent or foreperson who will supervise on site-work; (2) a list of equipment owned or leased by my firm for use on the project; (3) a list of all projects (public or private) which my firm is currently performing, is committed to perform, or intends to make a commitment to perform. I shall include, for each project, the names and telephone number of a contact person for the contracting organization, the dollar value of the work, a description of the work, and my firm's work schedule for the Project.

4. If you are awarded the Contract, my company intends to enter into an agreement with your firm to perform the items of work or other activity described on the following sheet for the prices indicated.

5. My firm has the ability to manage, supervise and perform the activity described on the following page.

______________________________ ______________________________

M/WBE Authorized Signature Date

MINORITY OR WOMEN'S BUSINESS ENTERPRISE PARTICIPATION LETTER OF INTENT
PAGE 2 OF 2

MASSDOT PROJECT NUMBER: CIP #1.3, #3.3, #9.3.1, #9.3.2, #10.3.1 and #10.3.3

PROJECT LOCATION: Barnstable, Bourne, Norton, Taunton, Foxborough, Medfield, and Sherborn, MA

DATE OF BID OPENING: May 26, 2022, 2:00 p.m.

NAME OF PRIME BIDDER: ______________________

Item number if applicable	Description of Activity with notations such as Labor Only, Material Only, or Complete	Quantity	Unit Price	Amount
		TOTAL AMOUNT:		

M/WBE COMPANY NAME: ______________________

M/WBE AUTHORIZED SIGNATURE: ______________________

NAME AND TITLE (PRINT): ______________________

TELEPHONE NUMBER: ____________ FAX NUMBER: ____________

*** END OF DOCUMENT ***

DOCUMENT 00761

SPECIAL PROVISIONS FOR CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

Revised: 02/09/16

I. Instructions for Certification - Primary Covered Transactions:

By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.

1. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the MassDOT's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

2. The certification in this clause is a material representation of fact upon which reliance was placed when the MassDOT determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available, the MassDOT may terminate this transaction for cause of default.

3. The prospective primary participant shall provide immediate written notice to the MassDOT if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the MassDOT for assistance in obtaining a copy of those regulations.

5. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the MassDOT.

6. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," provided by the MassDOT, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration and the Debarment Lists compiled by both the Massachusetts Office of the Attorney General and the Department of Capital Asset Management and Maintenance (DCAMM) and published separately in the Central Register.

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available, the MassDOT may terminate this transaction for cause or default.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Primary Covered Transactions

The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal, State or local department or agency;

2. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 2 of this certification; and

4. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

II. Instructions for Certification - Lower Tier Covered Transactions:

By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

1. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available the MassDOT may pursue available remedies, including suspension and/or debarment.

2. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

3. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the MassDOT for assistance in obtaining a copy of those regulations.

4. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the MassDOT.

5. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

6. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List and the Debarment Lists.

7. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

8. Except for transactions authorized under paragraph 4 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, the MassDOT may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions

The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal, State or local department or agency.

Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

*** END OF DOCUMENT ***

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DOCUMENT B00846

M/WBE OR SDVOBE JOINT CHECK ARRANGEMENT APPROVAL FORM

(to be submitted by Prime Contractor)

Contract No:____________ **Project No.** ___________________

Location: ____________________________________ **Bid Opening Date:** _______________________________

Project Description: ____

We have received the attached request for the use of a joint check arrangement from _________________ _________________________ , a M/WBE or SDVOBE on the above- referenced Contract and ___________________________ ________________, a Material Supplier/Vendor for the subject Contract. The M/WBE or SDVOBE has complied with the requirements of Special Provision Document 00718. In particular, the M/WBE or SDVOBE has:

- a written agreement with the material supplier/vendor;
- applied for credit with the subject material supplier and has supplied the vendor's response;
- shown that it will place all orders to the subject material supplier/vendor;
- made and retains all decision-making responsibilities concerning the materials; and
- provided a Joint Check Agreement that is acceptable to MassDOT;

As the Contractor for the Project, we agree to issue joint checks (made payable to the Material Supplier/Vendor and the M/WBE or SDVOBE) for payment of sums due pursuant to invoices from the Supplier/Vendor and M/WBE or SDVOBE.

Contractor:

____
Company Name

____
Signature
Duly Authorized

____
Printed Name

____
Date

____
Title

SubContractor:

____
Company Name

____
Signature –
Duly Authorized

____
Printed Name

____
Date

____
Title

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DOCUMENT B00847

JOINT VENTURE AFFIDAVIT

(All Firms)

- All Information Requested By This Schedule Must Be Answered. Additional Sheets May Be Attached.
- If, there is any change in the information submitted, the Joint Venture parties must inform MassDOT Pre-Qualifications Office (and, if one of the companies is a M/WBE or SDVOBE, the Director of Contract Compliance, Office of Civil Rights) *prior* to such change, in writing, either directly or through the Prime Contractor if the Joint Venture is a subcontractor.
- If the Joint Venture Entity will be the bidder on a prime Contract, it must bid and submit all required documents (insurance, worker's compensation, bonds, etc.) in the name of the Joint Venture Entity.

I. Name of Joint Venture: ____________________

Type of Entity if applicable (Corp., LLC):____________Filing State ____________

Address of joint venture: ____________________

____

Phone No(s) for JV Entity: ____________E-mail:____________

Contact Person(s)____________________

Tax ID/EIN of Joint Venture: ____________Vendor Code:____________

II. Identify each firm or party to the Joint Venture:

Name of Firm: ____________________

Address: ____________________

Phone : ____________E-mail:____________

Contact person(s) ____________________

Name of Firm: ____________________

Address: ____________________

Phone: ____________E-mail:____________

Contact Person(s)____________________

III. Describe the role(s) of the each party to the Joint Venture:

____

____

IV. Attach a copy of the Joint Venture Agreement. The proposed Joint Venture Agreement should include specific details including, but not limited to: (1) the contributions of capital and equipment; (2) work items to be performed by each company's forces, (3) work items to be performed under the supervision of any M/WBE or SDVOBE Venturer; (4) the commitment of management, supervisory and operative personnel employed by the M/WBE or SDVOBE to be dedicated to the performance of the Project; and (5) warranty, guaranty, and indemnification clauses.

V. Attach any applicable Corporate or LLC Votes, Authorizations, etc.

VI. Ownership of the Joint Venture:

A. What is the percentage(s) of each company's ownership in the Joint Venture?

ownership percentage(s): ____

ownership percentage(s): ____

B. Specify percentages for each of the following (provide narrative descriptions and other detail as applicable):

1. Sharing of profit and loss: ____

2. Capital contributions:

(a) Dollar amounts of initial contribution: ______________________________

(b) Dollar amounts of anticipated on-going contributions:____________________

(c) Contributions of equipment (specify types, quality and quantities of equipment to be provided by each firm): ____

____

4. Other applicable ownership interests, including ownership options or other agreements, which restrict or limit ownership and/or control:

____

____

5. Provide copies of all other written agreements between firms concerning bidding and operation of this Project or projects or contracts.

6. Identify all current contracts and contracts completed during the past two (2) years by either of the Joint Venture partners to this Joint Venture:

____

____

VII. Control of and Participation in the Joint Venture. Identify by name and firm those individuals who are, or will be, responsible for and have the authority to engage in the following management functions and policy decisions. (Indicate any limitations to their authority such as dollar limits and co-signatory requirements.):

A. Joint Venture check signing:

____

____

B. Authority to enter Contracts on behalf of the Joint Venture:

____

____

C. Signing, co-signing and/or collateralizing loans:

D. Acquisition of lines of credit:

E. Acquisition and indemnification of payment and performance bonds:

F. Negotiating and signing labor agreements:

G. Management of contract performance. *(Identify by name and firm only)*:

1. Supervision of field operations:
2. Major purchases:
3. Estimating:
4. Engineering:

VIII. Financial Controls of Joint Venture:

A. Which firm and/or individual will be responsible for keeping the books of account?

B. Identify the "Managing Partner," if any, and describe the means and measure of their compensation:

C. What authority does each firm have to commit or obligate the other to insurance and bonding companies, financing institutions, suppliers, subcontractors, and/or other parties participating in the performance of this Contract or the work of this Project?

IX. Personnel of Joint Venture: State the approximate number of personnel (by trade) needed to perform the Joint Venture's work under this Contract. Indicate whether they will be employees of the majority firm, M/WBE or SDVOBE firm, or the Joint Venture.

	Firm 1 (number)	Firm 2 (number)	Joint Venture (number)
Trade			
Professional			
Administrative/Clerical			
Unskilled Labor			

Will any personnel proposed for this Project be employees of the Joint Venture?: ______________

If so, who: ____

A. Are any proposed Joint Venture employees currently employed by either firm?

Employed by Firm 1: _____________Employed by firm 2 ______________________________

B. Identify by name and firm the individual who will be responsible for Joint Venture hiring: ____

____

X. Additional Information. Please state any material facts and additional information pertinent to the control and structure of this Joint Venture.

____

____

XI. AFFIDAVIT OF JOINT VENTURE PARTIES. The undersigned affirm that the foregoing statements and attached documents are correct and include all material information necessary to identify and explain the terms and operations of our Joint Venture and the intended participation of each firm in the undertaking. Further, the undersigned covenant and agree to provide to MassDOT current, complete and accurate information regarding actual Joint Venture work, payments, and any proposed changes to any provisions of the Joint Venture, or the nature, character of each party to the Joint Venture. We understand that any material misrepresentation will be grounds for terminating any Contract awarded and for initiating action under Federal or State laws concerning false statements.

______________________________ Firm 1	______________________________ Firm 2
______________________________ Signature Duly Authorized	______________________________ Signature Duly Authorized
______________________________ Printed Name and Title	______________________________ Printed Name and Title
______________________________ Date	______________________________ Date

*** END OF DOCUMENT ***

DOCUMENT 00820

THE COMMONWEALTH OF MASSACHUSETTS SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY, NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

I. Definitions

For purposes of this contract,

"Minority" means a person who meets one or more of the following definitions:

(a) American Indian or Native American means: all persons having origins in any of the original peoples of North America and who are recognized as an Indian by a tribe or tribal organization.
(b) Asian means: All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian sub-continent, or the Pacific Islands, including, but Not limited to China, Japan, Korea, Samoa, India, and the Philippine Islands.
(c) Black means: All persons having origins in any of the Black racial groups of Africa, including, but not limited to, African-Americans, and all persons having origins in any of the original peoples of the Cape Verdean Islands.
(d) Eskimo or Aleut means: All persons having origins in any of the peoples of Northern Canada, Greenland, Alaska, and Eastern Siberia.
(e) Hispanic means: All persons having their origins in any of the Spanish-speaking peoples of Mexico, Puerto Rico, Cuba, Central or South America, or the Caribbean Islands.

"State construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility, or a contract for the construction, reconstruction, alteration, remodeling or repair of a public work undertaken by a department, agency, board, or commission of the commonwealth.

"State assisted construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility undertaken by a political subdivision of the commonwealth, or two or more political subdivisions thereof, an authority, or other instrumentality and whose costs of the contract are paid for, reimbursed, grant funded, or otherwise supported, in whole or in part, by the commonwealth.

II. Equal Opportunity, Non-Discrimination and Affirmative Action

During the performance of this Contract, the Contractor and all subcontractors (hereinafter collectively referred to as "the Contractor") for a state construction contract or a state assisted construction contract, for him/herself, his/her assignees and successors in interest, agree to comply with all applicable equal employment opportunity, non-discrimination and affirmative action requirements, including but not limited to the following:

In connection with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability, shall not discriminate in the selection or retention of subcontractors, and shall not discriminate in the procurement of materials and rentals of equipment.

The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising, layoff or termination; rates of pay or other forms of compensation; conditions or privileges of employment; and selection for apprenticeship or on-the-job training opportunity. The Contractor shall comply with the provisions of chapter 151B of the Massachusetts General Laws, as amended, and all other applicable anti-discrimination and equal opportunity laws, all of which are herein incorporated by reference and made a part of this Contract.

The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Massachusetts Commission Against Discrimination setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter l51 B).

In connection with the performance of work under this contract, the Contractor shall undertake, in good faith, affirmative action measures to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability. Such affirmative action measures shall entail positive and aggressive measures to ensure nondiscrimination and to promote equal opportunity in the areas of hiring, upgrading, demotion or transfer, recruitment, layoff or termination, rate of compensation, apprenticeship and on-the-job training programs. A list of positive and aggressive measures shall include, but not be limited to, advertising employment opportunities in minority and other community news media; notifying minority, women and other community-based organizations of employment opportunities; validating all job specifications, selection requirements, and tests; maintaining a file of names and addresses of each worker referred to the Contractor and what action was taken concerning such worker; and notifying the administering agency in writing when a union with whom the Contractor has a collective bargaining agreement has failed to refer a minority or woman worker. These and other affirmative action measures shall include all actions required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability. One purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future Commonwealth public construction projects.

III. Minority and Women Workforce Participation

Pursuant to his/her obligations under the preceding section, the Contractor shall strive to achieve on this project the labor participation goals contained herein. Said participation goals shall apply in each job category on this project including but not limited to bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers and those classes of work enumerated in Section 44F of Chapter 149 of the Massachusetts General Laws. The participation goals for this project shall be 15.3% for minorities and 6.9% for women. The participation goals, as set forth herein, shall not be construed as quotas or set-asides; rather, such participation goals will be used to measure the progress of the Commonwealth's equal opportunity, non-discrimination and affirmative action program. Additionally, the participation goals contained herein should not be seen or treated as a floor or as a ceiling for the employment of particular individuals or group of individuals.

IV. Liaison Committee

At the discretion of the agency that administers the contract for the construction project there may be established for the life of the contract a body to be known as the Liaison Committee. The Liaison Committee shall be composed of one representative each from the agency or agencies administering the contract for the construction project, hereinafter called the administering agency, a representative from the Office of Affirmative action, and such other representatives as may be designated by the administering agency. The Contractor (or his/her agent, if any, designated by him/her as the on-site equal employment opportunity officer) shall recognize the Liaison Committee as an affirmative action body, and shall establish a continuing working relationship with the Liaison Committee, consulting with the Liaison Committee on all matters related to minority recruitment, referral, employment and training.

V. Reports and Records

The Contractor shall prepare projected workforce tables on a quarterly basis when required by the administering agency. These shall be broken down into projections, by week, of workers required in each trade. Copies shall be furnished one week in advance of the commencement of the period covered, and also, when updated, to the administering agency and the Liaison Committee when required.

The Contractor shall prepare weekly reports in a form approved by the administering agency, unless information required is required to be reported electronically by the administering agency, the number of hours worked in each trade by each employee, identified as woman, minority, or non-minority. Copies of these shall be provided at the end of each such week to the administering agency and the Liaison Committee.

Records of employment referral orders, prepared by the Contractor, shall be made available to the administering agency on request.

The Contractor will provide all information and reports required by the administering agency on instructions issued by the administering agency and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the administering agency to effect the employment of personnel. This provision shall apply only to information pertinent to the Commonwealth's supplementary non-discrimination, equal opportunity and access and opportunity contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the administering agency and shall set forth what efforts he has made to obtain the information.

VI. Access to Work Site

A designee of the administering agency and a designee of the Liaison Committee shall each have a right to access the work site.

VII. Solicitations for Subcontracts, and for the Procurement of Materials and Equipment

In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for the procurement of materials or equipment, each potential subcontractor or supplier shall be notified in writing by the Contractor of the Contractor's obligations under this contract relative to non-discrimination and equal opportunity.

VIII. Sanctions

Whenever the administering agency believes the General or Prime Contractor or any subcontractor may not be operating in compliance with the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter 151B), the administering agency may refer the matter to the Massachusetts Commission Against Discrimination ("Commission") for investigation.

Following the referral of a matter by the administering agency to the Massachusetts Commission Against Discrimination, and while the matter is pending before the MCAD, the administering agency may withhold payments from contractors and subcontractors when it has documentation that the contractor or subcontractor has violated the Fair Employment Practices Law with respect to its activities on the Project, or if the administering agency determines that the contractor has materially failed to comply with its obligations and the requirements of this Section. The amount withheld shall not exceed a withhold of payment to the General or Prime Contractor of 1/100 or 1% of the contract award price or $5,000, whichever sum is greater, or, if a subcontractor is in non-compliance, a withhold by the administering agency from the General Contractor, to be assessed by the General Contractor as a charge against the subcontractor, of 1/100 or 1% of the subcontractor price, or $1,000 whichever sum is greater, for each violation of the applicable law or contract requirements. The total withheld from anyone General or Prime Contractor or subcontractor on a Project shall not exceed $20,000 overall. No withhold of payments or investigation by the Commission or its agent shall be initiated without the administering agency providing prior notice to the Contractor.

If, after investigation, the Massachusetts Commission Against Discrimination finds that a General or Prime Contractor or subcontractor, in commission of a state construction contract or state-assisted construction contract, violated the provisions of the Fair Employment Practices Law, the administering agency may convert the amount withheld as set forth above into a permanent sanction, as a permanent deduct from payments to the General or Prime Contractor or subcontractor, which sanction will be in addition to any such sanctions, fines or penalties imposed by the Massachusetts Commission Against Discrimination.

No sanction enumerated under this Section shall be imposed by the administering agency except after notice to the General or Prime Contractor or subcontractor and an adjudicatory proceeding, as that term is used, under Massachusetts General Laws Chapter 30A, has been conducted.

IX. Severability

The provisions of this section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the remaining provisions.

X. Contractor's Certification

After award and prior to the execution of any contract for a state construction contract or a state assisted construction contract, the Prime or General Contractor shall certify that it will comply with all provisions of this Document 00820 Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program, by executing Document 00859 Contractor/Subcontractor Certification Form.

XI. Subcontractor Requirements

Prior to the award of any subcontract for a state construction contract or a state assisted construction contract, the Prime or General Contractor shall provide all prospective subcontractors with a complete copy of this Document 00820 entitled "Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program" and will incorporate the provisions of this Document 00820 into any and all contracts or work orders for all subcontractors providing work on the Project. In order to ensure that the said subcontractor's certification becomes a part of all subcontracts under the prime contract, the Prime or General Contractor shall certify in writing to the administering agency that it has complied with the requirements as set forth in the preceeding paragraph by executing Document 00859 Contractor/Subcontractor Certification Form.

Rev'd 03/07/14

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DOCUMENT 00821

ELECTRONIC REPORTING REQUIREMENTS
CIVIL RIGHTS PROGRAMS AND CERTIFIED PAYROLL

Implemented on March 2, 2009 Revised June 04, 2019

The Massachusetts Department Of Transportation (MassDOT) has replaced the CHAMP reporting system with Equitable Business Opportunity Solution (EBO), a new web-based civil rights reporting software system. This system is capable of handling both civil rights reporting requirements and certified payrolls. The program's functions include the administration of Equal Employment Opportunity (EEO) requirements, On-The-Job Training requirements (OJT), Disadvantage Business Enterprise (DBE) and/or Minority / Women's Business Enterprise (M/WBE) subcontracting requirements, and the electronic collection of certified payrolls associated with MassDOT projects. In addition, this system is used to generate various data required as part of the American Recovery and Reinvestment Act (ARRA). Contractors are responsible for all coordination with all sub-contractors to ensure timely and accurate electronic submission of all required data.

Contractor and Sub-Contractor EBO User Certification

All contractors and sub-contractors must use the EBO software system. The software vendor, Internet Government Solutions (IGS), has developed an online EBO Training Module that is available to contractors and sub-contractors. This module is a self-tutorial which allows all users in the company to access the training, complete the tutorial, and become certified as EBO users for a one time fee of $75.00. This is the only cost to contractors and sub-contractors associated with the EBO software system. The online EBO Training Module can be accessed at www.ebotraining.com. Click the "Register My Company" button on the login page to begin your training registration. Questions regarding EBO online training should be directed to Gerry Anguilano, IGS at (440) 238-1684.

MassDOT will track contractors and sub-contractors who have successfully completed the on-line training module. All persons performing civil rights program and/or certified payroll functions should be EBO certified.

Vetting of Firms and Designated Firm Individuals

Contractors must authorize a Primary Log-In ID Holder who has completed EBO on-line training to have access to the EBO system by completing and submitting the "Request For EBO System Log-In/Password Form" located on the MassDOT website at: https://www.mass.gov/how-to/how-to-get-an-ebo-login
Contractors must also agree to comply with the EBO system user agreement located on the MassDOT website.

All subcontracts entered into on a project must include language that identifies the submission and training requirements that the sub-contractor must perform. Sub-contractors will be approved by the respective District Office of MassDOT through the existing approval process. When new sub-contractors, who have not previously worked for MassDOT, are initially selected by a general contractor, the new sub-contractor must be approved by the District before taking the EBO on-line training module.

Interim Reporting Requirements

Until MassDOT is satisfied that the EBO system is fully operational and functioning as designed, contractors and sub-contractors will be required to submit certified payrolls manually. There will be a transition period where dual reporting, through manual and electronic submission, will be required. MassDOT, however, will notify contractors and sub-contractors when they may cease manual submission of certified payrolls.

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DOCUMENT 00859

CONTRACTOR/SUBCONTRACTOR CERTIFICATION FORM ‡

____ **(Contractor)** **Date:**____

‡This form shall be prepared and submitted to MassDOT for each and every subcontractor; the Prime Contractor shall ensure that the indicated documents have been given, as applicable, to its SubContractors.

____**(Subcontractor)** ☐ District Approved **S**ubcontractor

Contract No:________________**Federal Aid No.:** ______________________ ______________________

Location: ____

Project Description: ____

PART 1 CONTRACTOR CERTIFICATION: I hereby certify, as an authorized official of this company, that to the best of my knowledge, information and belief, the company is in compliance with all applicable federal and state laws, rules, and regulations governing fair labor and employment practices, that the company will not discriminate in their employment practices, that the company will make good faith efforts to comply with the minority employee and women employee workforce participation ratio goals and specific affirmative action steps contained in Contract Document 00820 The Commonwealth of Massachusetts Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program, and that the company will comply with the special provisions and documentation indicated below (as checked).

I further hereby certify, as an authorized official of this company, that the special provisions and documentation indicated below (as checked) have been or are included in, and made part of, the Subcontractor Agreement entered into with the firm named above.

☐ **This is not a Federally-aided construction project**

Document #

☐ 00718 –Participation By Minority Or Women's Business Enterprises and SDVOBE†
☐ 00761 –Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion
☐ 00820 – MA Supplemental Equal Employment Opportunity, Non-Discrimination, and Affirmative Action Program
☐ 00821 – Electronic Reporting Requirements, Civil Rights Programs, and Certified Payroll
☐ 00859 – Contractor/Subcontractor Certification Form (this document)
☐ 00860 – MA Employment Laws
☐ 00861 – Applicable State Wage Rates in the Contract Proposal**
☐ B00842 – MA Schedule of Participation By Minority or Women Business Enterprises (M/WBEs)†
☐ B00843 – MA Letter of Intent – M/WBEs†

** Does not apply to Material Suppliers, unless performing work on-site
† Applies only if Subcontractor is a M/WBE; only include these forms for the particular M/WBE Entity

☐ B00844 - Schedule of Participation By SDVOBE
☐ B00845 - Letter of Intent – SDVOBE
☐ B00846 – M/WBE or SDVOBE Joint Check Arrangement Approval Form
☐ B00847 – Joint Venture Affidavit

☐**This is a Federally-aided construction project (Federal Aid Number is present)**

Document #

☐ 00719 – Special Provisions for Participation by Disadvantaged Business Enterprises†
☐ 00760 - Form FHWA 1273 - Required Contract Provisions for Federal-Aid Construction Contracts
☐ 00820 – MA Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program
☐ 00821 – Electronic Reporting Requirements, Civil Rights Programs and Certified Payroll
☐ 00859 – Contractor/Subcontractor Certification Form (this document)

☐ 00860 – MA Employment Laws
☐ 00870 – Standard Federal Equal Employment Opportunity Construction Contract Specifications Executive Order 11246, (41 CFR Parts 60-4.2 and 60-4.3 (Solicitations and Equal Opportunity Clauses)*****
☐ 00875 – Federal Trainee Special Provisions
☐ B00853 – Schedule of Participation by Disadvantaged Business Enterprise†
☐ B00854 – Letter of Intent – DBEs†
☐ B00855 – DBE Joint Check Arrangement Approval Form
☐ B00856 – Joint Venture Affidavit
☐ 00861/00880 - Applicable state and federal wage rates from Contract Proposal******

*****Applicable only to Contracts or Subcontracts in excess of $10,000
******Does not apply to Material Suppliers, unless performing work on-site
† Applies only if Subcontractor is a DBE; only include these forms for the particular DBE Entity

Signed this _________________ Day of ___________________, 20_____ Under The Pains And Penalties Of Perjury.

____ (Print Name and Title)
____ (Authorized Signature)

PART 2

PART 2 SUBCONTRACTOR CERTIFICATION: I hereby certify, as an authorized official of this company, that the required documents in Part 1 above were physically incorporated in our Agreement/Subcontract with the Contractor and give assurance that this company will fully comply or make every good faith effort to comply with the same. I further certify that:

1. This company recognizes that if this is a Federal-Aid Project, then this Contract is covered by the equal employment opportunity laws administered and enforced by the United States Department of Labor (“USDOL”), Office of Federal Contract Compliance Programs (‘OFCCP”). By signing below, we acknowledge that this company has certain reporting obligations to the OFCCP, as specified by 41 CFR Part 60-4.2.

2. This company further acknowledges that any contractor with fifty (50) or more employees on a Federal-aid Contract with a value of fifty-thousand ($50,000) dollars or more must annually file an EEO-1 Report (SF 100) to the EEOC, Joint Reporting Committee, on or before September 30th, each year, as specified by 41 CFR Part 60-1.7a.

3. For more information regarding the federal reporting requirements, please contact the USDOL, OFCCP Regional Office, at 1-646-264-3170 or EEO-1, Joint Reporting Committee at 1-866-286-6440. You may also find guidance at: http://www.dol.gov/ofccp/TAguides/consttag.pdf or http://www.wdol.gov/dba.aspx#0.

4. This company ☐ has, ☐ has not, participated in a previous contract or subcontract subject to the Equal Opportunity clauses set forth in 41 CFR Part 60-4 and Executive Order 11246, and where required, has filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance Programs or the EEO Commission all reports due under the applicable filing requirements.

5. This company is in full compliance with applicable Federal and Commonwealth of Massachusetts laws, rules, and regulations and is not currently debarred or disqualified from bidding on or participating in construction contracts in any jurisdiction of the United States. See : http://www.massdot.state.ma.us/Debarred.aspx.

6. This company is properly registered and in good standing with the Office of the Secretary of the Commonwealth.

Signed this ________ Day of ________________, 20_____, Under The Pains And Penalties Of Perjury.

Firm: ____________________________________
Address: _________________________________
____

____________________________________ (Print Name and Title)

____

Telephone Number:________________________________

Federal I.D. Number:_______________________________

Estimated Start Date:_______________________________

Estimated Completion Date:________________________

Estimated Dollar Amount:__________________________

____
(Authorized Signature)

____
(Date)

Rev’d 06/03/14

*** END OF DOCUMENT ***

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

CHANGE ORDER FORM

Date of Change Order Issue: ____________________________ Change Order No. __________________

Description of Change:____

Purpose of Change:____

Justification for Change:____

Supporting Documentation:____

Estimated Cost of Change:____

Impact on Project Completion Date as a result of Change:____

This document will become a supplement to the CONTRACT and all provisions of the CONTRACT will apply to Change Order Work.

MassDOT Rail and Transit Division and Contractor or Specialty Contractor agree that the price and time adjustment to the CONTRACT are equitable and acceptable to all parties.

Requested by: ____ Date: _______________
(Representative of Contractor or Specialty Contractor)

Approved by: ____ Date: _______________
(Representative of MassDOT)

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FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

TRAIN OPERATIONS SCHEDULE

MassDOT Rail and Transit (MassDOT) is working out a schedule with both MCRR and CSX to provide the Contractor with extended work windows throughout the project. There will be no train service from 7:00 AM to 7:00 PM on weekends on the South Dennis Line. MCRR freight and passenger trains operate on Cape Main, Falmouth Line, and South Dennis Line throughout the year. MBTA Cape Flyer operates on Cape Main on weekends between Memorial Day and Labor Day inclusive the holidays.

The following train schedule information is provided to give the Contractor an idea of work windows that can be expected during the execution of this Project. All dates and times provided are approximate and may vary depending on a variety of factors.

Contractor will be expected to clear the mainline track for the passage of trains.

MIDDLEBORO SUBDIVISION:

Freight service is conducted on the Middleboro Subdivision by both MCRR and CSX Transportation each weekday. The current weekday schedule for MCRR freight trains and CSX freight trains on the Middleboro Subdivision is as follows:

MCRR Schedule on Middleboro Subdivision

MCRR Train MC-4 (Dean Street to Cotley) Schedule:

Monday - Friday	Southbound – 6:00am - 8:00am	Northbound – 4:00 pm - 7:00 pm

CSX Schedule on Middleboro Subdivision

CSX Train B726 Schedule:

7 days a week	Southbound – Attleboro to Middleboro - 5:00 am - 9:00 am

CSX Train B727 Schedule:

Monday - Friday	Northbound – Middleboro to Cotley - 8:30 am - 10:00 am
Monday-Friday	Southbound – Attleboro to Middleboro - 3:30 pm - 5:00 pm

Notes:

- Times given are approximate and may vary depending on a variety of factors.
- Contractor shall coordinate work windows and train moves with MCRR and on scheduling any necessary track outages required to perform the work.

FRAMINGHAM SECONDARY:

Freight service is conducted on the Framingham Secondary by CSX Transportation each weekday. The current weekday schedule for CSX freight trains on the Framingham Secondary is as follows:

CSX Schedule on Framingham Secondary

CSX Train B725 Schedule:

7 days a week	Northbound – Mansfield to Framingham - 6:30am - 09:00am

CSX Train B733 Schedule:

Monday-Friday	Southbound – Walpole to Mansfield - 7:00am - 10:30am
Monday-Friday	Northbound – Mansfield to Walpole - 4:15pm - 6:00pm

CSX Train B731 Schedule:

Monday-Friday	Northbound – Walpole to Framingham - 9:30am - 11:30am
Monday-Friday	Southbound – Framingham to Walpole - 1:45pm - 3:25pm

Be advised that the MBTA may operate trains to Gillette Stadium for special events.

Notes:

- Times given are approximate and may vary depending on a variety of factors.
- Make note of the potential special event passenger service at Gillette Stadium on the Framingham Secondary.
- Contractor shall coordinate work windows and train moves with MCRR and on scheduling any necessary track outages required to perform the work.

CAPE MAIN:

Cape Cod Central Railroad:

Seasonal Train Schedule

TRAIN	BEGINS	DAY(S)	TIME	FROM/TO
DINNER	May 17, 2022	Thurs, Fri & Sat	5:30 PM – 8:30 PM & Sat 4:00 PM – 7:00 PM	Hyannis/Falmouth/Hyannis
JAZZ & SUNDAY BRUNCH	April 3, 2022,	All Sundays	11:30 AM – 2:00 PM	Hyannis/Sagamore/Hyannis
LUNCH	June 8, 2022	Every Wed	11:30 AM – 2:00 PM	Hyannis/Sagamore/Hyannis
CAPE COD EXCURSION	May 14, 2022	Sat & Sun	11:30 AM – 2:00 PM	Hyannis/Sagamore/Hyannis
CANAL EXCURSIONS	May 7, 2022		12:00 PM – 1:00 PM	Bay/Buzzards Bay/Bay
*Normal operating season begins	May 7, 2022	Wed, Thurs, Fri, Sat & Sun	Varies	Contact MCRR for Details
MBTA QUALIFING	May 15, 2022	TBD	TBD	Bay/Buzzards Bay/Bay

Notes:

- Times given are approximate and may vary depending on a variety of factors.
- Currently, all Saturday trains from 5/28/2022 – 9/3/2022 run down the Falmouth Line are the Dinner Trains and Cape Cod Excursion Trains with scheduled departures from North Falmouth, refer to the Cape Cod Central Railroad 2022 schedule.
- Additional "Special" Scenic and Dinner trains may be operated but have not yet been scheduled for the fall seasons.
- Not all trains shown on Cape Cod Central Railroad schedule will run, occasionally some are cancelled for lack of ridership, inclement weather and other factors.
- Departure, arrival and trip times are approximate and subject to change.
- Contractor shall coordinate work windows and train moves with MCRR and on scheduling any necessary track outages required to perform the work.

FALMOUTH LINE:

TRAIN	BEGINS	DAY(S)	TIME	FROM/TO
ENERGY TRAIN	Year Round	*Mon → Fri	11:00 AM – 4:00 PM	Otis Transfer Station / SEMASS

Notes:

- Times given are approximate and may vary depending on a variety of factors.
- Falmouth Line schedule is subject to change as the needs of the customer may change.
- Currently, the only trains scheduled to run down the Falmouth Line are selective Dinner Trains with scheduled departures from North Falmouth, refer to the Cape Cod Central Railroad 2020 schedule.
- * Falmouth Line will periodically have a Saturday train.
- Contractor shall coordinate work windows and train moves with MCRR and on scheduling any necessary track outages required to perform the work.

The Falmouth Line is an active freight rail line servicing the Otis Transfer Station in Falmouth, MA. Service to Otis Transfer Station shall remain operational throughout the duration of the project (except during specified construction windows). The Falmouth Line is owned by the Commonwealth of Massachusetts Department of Transportation (MassDOT) and is operated and maintained under contract by Massachusetts Coastal Railroad (MCRR or Railroad).

Cape Cod Central Railroad runs seasonal dinner, lunch, brunch, and excursion trains on MassDOT owned rail lines on Cape Cod. A limited number of these trains will utilize the Falmouth Line as part of their route. See the seasonal train schedule for Cape Cod Central Railroad trains on the next page. Coordination with Railroad required in scheduling work windows around any Cape Cod Central trains that may access the planned work are on the Falmouth Line.

END OF SECTION

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISON, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

TECHNICAL SPECIFICATIONS
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PROJECT NOTES

GENERAL

A. This document contains the specifications and requirements for the work to be completed under the FY 2022 & FY 2023 Track Capital Improvement Program for the Cape Main, Middleboro Subdivision, Framingham Secondary, and Falmouth Line At-Grade Railroad Crossing Rehabilitation Project.

B. Associated tasks include:

- Furnishing Submittals
- Protection of Work and Property
- Site Preparation
- Erosion and Sedimentation Control
- Existing Site Utilities
- Demolition (of Track)
- Excavation and Backfill
- Timber Crosstie
- Distribution and Installation of Wood Crossties
- Furnish and Install Ballast
- General Track Construction
- Final Surface and Alignment of Track
- Welding of Rail
- Removal and Replacement of Defective Tie Plates
- Installation of Replacement Rail
- Pre-Cast Concrete Grade Crossing
- Grade Crossing (Rubber Rail Seal)
- HMA Installation
- Curbs, Gutters, and Walks
- Cast in Place Concrete
- Portland Cement Concrete
- Detectable Warning Panels
- Pavement Markings and Signage
- Traffic Regulation
- Cleanup and Disposal of Crossties
- CWR Installation and De-Stressing
- As-Built Construction Plans
- Allowances

C. These specifications are issued along with the General Conditions, Special Conditions, Project Description, Scope of Work, Project Schedule and other Project documents. See Table of Contents.

D. Note that some of the Specification sections listed above are included to address conditions which are not expected to be encountered during the execution of this project. It is anticipated that no subsurface structure demolition / removal will be required. These sections are included to provide direction to the Contractor in the event of unexpected circumstances.

E. For the purposes of these Specifications, the Massachusetts Department of Transportation Rail and Transit Division (MassDOT or Owner) is identified as the party specifying the quantity, quality, and terms of work to be performed and Contractor is identified as the party responsible for the performance of work as described in the Specifications.

APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards and publications shall apply to the Contract, except as they may be modified herein, and are hereby made part of these Specifications to the extent required.

1. American Railway Engineering and Maintenance Association, Manual for Railway Engineering, latest edition, herein referred to as the AREMA Manual
2. American Railway Engineering and Maintenance Association, Portfolio of Trackwork Plans, latest edition, herein referred to as the AREMA Portfolio.
3. MassDOT MW-1 Specification for Construction and Maintenance of Track
4. MBTA Railroad Operations Book of Standard Plans, Track and Roadway
5. MBTA Commuter Rail Material Specification
6. MBTA Commuter Rail Design Standards Manual

MATERIALS

A. Materials supplied by MassDOT (Owner) are identified in the Special Conditions and meet the requirements outlined in the Technical Specifications.

B. Materials to be supplied by Contractor are identified in the Special Conditions and shall meet the requirements outlined in the Technical Specifications.

C. Contractor shall adhere to the Buy America or Buy American requirement for material in this project. Contractors are reminded that all material must meet specifications in every respect and that all work is warranted for a period of one year as stipulated by the General Conditions, Article 11 – Quality Assurance.

REQUIRED MOW EQUIPMENT

A. Contractor shall submit a list of construction equipment to be used including its weights and dimensions. The equipment will not be permitted on Owner/Railroad property until it has been approved.

B. Contractor shall verify that his track-mounted or Hi-Rail equipment complies with the standards set by the AAR Mechanical Division.

C. Operate only equipment in a good state of repair and with all safety appliances and protective devices in place and functional.

D. Rail wheels with flat spots of length exceeding 8 percent of the wheel diameter are prohibited. Any equipment with a wheel with a flat spot exceeding 5 percent of the wheel diameter is restricted to a maximum speed of 10mph on bridges.

E. Contractor's equipment shall not exceed the design loads for any track or structure. Contractor shall verify that proposed equipment meets these requirements.

F. Contractor's equipment shall physically clear all fixed obstructions within the limit of the project, including signal and power installations. Any damage caused by Contractor will be repaired or replaced as determined by the Railroad at no additional cost to Owner or Railroad.

G. To insure that the new track construction through the at-grade crossings and approaches are properly surfaced and lined, it is required that the at-grade crossings and approaches be tamped utilizing mechanical methods. In addition, the wasting of excavated reusable material is to be done alongside the Railroad Right-of Way within five (5) miles of the excavation site. As a result, Contractor will be required to furnish, in good working order, and use daily, at a minimum, the following pieces of standard railroad equipment (with qualified operators):

- 1 Mark IV Production Tamper or approved equal with functioning track geometry computer with printable readouts. (Note: A production type tamper, Harsco 6700 or approved equal, may be used under the direct supervision of the on-site survey crew)
- 1 KBR-850 or approved equal Ballast Regulator w/ Broom
- 2 Hi-rail Roto Dump trucks

In addition, the following personnel and equipment are needed when the Production Tamper is in service:

- One (1) qualified mechanic properly outfitted with a mechanic's truck with fluids, parts and tools will be on site at all times when the Production Tamper is in service.
- Survey Crew in the event that the Production Tamper's computer geometry system is not able to align and surface the track per the Contract Plans.

QUALITY CONTROL

A. Contractor shall be experienced in the construction of the various types of trackwork included in this Contract. Such experience shall have been gained on at least three previous contracts of similar volume of work with other North American transit properties or railroads.

B. Contractor shall adequately supervise their personnel, equipment and processes to ensure the requirements of these specifications are being met at all times during the production process.

C. Contractor shall have at least one (1) qualified Supervisor and one (1) qualified Foreperson on site at all times to oversee, instruct and assure quality workmanship. The Supervisors function is to supervise and ensure quality, not to operate equipment.

D. Contractor shall perform all measures necessary to assure quality of the Work. This shall include source quality control and field quality control requirements.

E. Quality shall be monitored at all times. Railroad and Owner shall provide continuous inspection of all work to ensure consistency and quality.

F. Contractor shall have on site at all times a sufficient number of qualified Machine Operators to ensure safe operation and quality workmanship.

G. Contractor shall ensure there is a sufficient number of Laborers to perform all tasks as needed for construction and QC operations.

REQUIRED NUMBER OF PRODUCTION TAMPER PASSES

A. A minimum of three (3) passes shall be required throughout the entire crossing and crossing approaches. Track stabilization and ballast compaction shall be approved the Railroad or Owner's Authorized Representative prior to the installation of any grade crossing material.

REMOVAL OF METAL TRACK MATERIAL

A. All rail, spikes, bolts, anchors, and OTM removed and/or replaced as part of this contract shall be collected and delivered to Railroad for re-use or scrap. Material shall be delivered to a MassDOT storage facility within 75 miles of the project site as directed by Railroad or Owner's Authorized Representative.

B. Track material furnished by Contractor, but not installed, is to be collected by Contractor and delivered to a secure MassDOT material storage facility within 75 miles of the project site(s). The unused material will become the property of Owner/Railroad.

DISPOSAL OF EXCAVATED MATERIAL

A. The area excavated for new and relocated trackwork shall be to the limits shown the Contract Plans.

B. The wasting of excavated reusable material is to be done alongside the Railroad Right-of Way within five (5) miles of the excavation site as directed by the Railroad or Owner's Authorized Representative.

CLEANUP AND DISPOSAL OF DEFECTIVE CROSSTIES, CROSSING TIMBER AND WOOD MATERIAL

A. Disposal Regulations

1. Contractor shall notify the Railroad which facility will be used to dispose of crossties and crossing timber. A copy of the Mass DEP certification showing that it is an approved disposal

facility along with all weight slips for crossties/timbers sent to an approved facility shall be provided to Owner and Railroad.

B. **Disposal of Old Crossties and Switch Timber**

1. Contractor is responsible for the cleanup of all crossties and timber. All old crossties and timber are to be picked up, bundled (if possible), and disposed of at a Mass DEP approved disposal site as specified in the Scope of Work.

SUBGRADE PREPARATION SUBBALLAST AND BOTTOM BALLAST

A. Contractor shall thoroughly mechanically compact subgrade in area of ballasted track construction with double drum vibratory roller. Furnish and install a minimum of 4” of subballast on the prepared, compacted subgrade. Then furnish and install a minimum 4” of bottom ballast on the prepared, subballast. Thoroughly compact bottom ballast with double-drum vibratory roller prior to the installation of any new ballast.

END OF SECTION

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SUBMITTALS

GENERAL

A. This Section specifies the general requirements and procedures for preparing and transmitting data to the Engineer for information, acceptance, or approval.

GENERAL PROCEDURES

A. Unless otherwise directed, submittals required by the Contract Documents shall be transmitted in form of PDF files using e-mail addressed to the Engineer designated by the Owner (MassDOT) and copied to other addressees to be determined after the Contract Award. Submittals made by the subcontractors shall be transmitted to and sequentially numbered by the Contractor.

The Contractor shall prepare draft of transmittal form and submit it to Engineer for approval. Transmittal form shall have Contractor's letterhead and shall include the following:

1. Submittal number. Submittals shall be sequentially numbered. Revisions shall have original submittal number identified by capital letter (A, B, etc.)
2. Contract number and title
3. Submittal title
4. Date sent to the Engineer
5. Date of anticipated response from the Engineer. Review time shall be as specified herein.
6. Names of subcontractors, suppliers, manufacturers
7. Required specification references including section name, number, and paragraph reference
8. Category and type of submittal, purpose, description, including intended application of submitted material
9. Any additional information that the Contractor may find helpful in review process.
10. Distribution record (for both transmittals and submittals)
11. Name and Signature of Project Manager.
12. Transmittal shall have a minimum 4in x 4in space for review stamp.
13. By making submittal the Contractor certifies that he examined and checked submission for accuracy, completeness, and compliance with Contract before delivery to Engineer.
    a. Stamp and sign each submission with following statement: "Having checked this submission, we certify that it conforms to the requirements of the Contract in all

respects, except as otherwise indicated." Exceptions from this statement, if any, shall be clearly identified.

b. By reviewing and approving each submittal, Contractor represents that he has determined and verified materials, field measurements and field construction criteria related thereto, and has checked and coordinated information contained within such submittals with requirements of Work and Contract.

c. Submit one construction material or one drawing per submittal for review. If required for review submit a set of drawings germane to the submittal subject.

14. The Contractor shall maintain submittal log in Excel format and provide the Engineer with updated submittal log on a bi-weekly basis. Submittal log shall have name of submittal, specification or drawing reference number, date submitted, date approved or rejected and comments, which identifies the status of each submission.

15. Certify shop drawings, working drawings and calculations by a professional engineer registered in the Commonwealth of Massachusetts when required by individual Specification Sections. Convey, or be accompanied by, information sufficient to completely explain the structures, machines, or systems described and their intended manner of use. When professional certification is required by Contract requirements, Engineer is entitled to rely upon accuracy and completeness of such calculations and certifications.

B. Engineer's Review and Action

1. Engineer will review Contractor's submittals only for the purpose of conformance with information given and design concept expressed in Contract requirements. Review of submittals is not conducted for purpose of determining accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain responsibility of Contractor as required by Contract. Engineer's review will not constitute approval of safety precautions or, unless specifically stated by Engineer, of any construction means, methods, techniques, sequences, or procedures. Engineer's review of a specific item does not indicate approval of entire assembly of which the item is a component.

2. Submittal review will be provided no later than five (5) calendar days after receiving submittal, unless review requires extension due to submittal volume, required investigation or study. The Contractor will be notified within five (5) calendar days after the receipt of the submission by a written notice of the reason why the decisions cannot be made within the five (5) day period and the date by which the decisions will be made. The Contractor shall avoid sending a batch of unrelated submittals simultaneously which will extend review time.

3. Contractors' submittals will be stamped with one of following dispositions:

   1) APPROVED: Work may proceed, provided it complies with Contract. Approval of shop drawings and samples will be general, but approval is not construed:

      a) As relieving Contractor of responsibility for any errors or omissions, including details, dimensions, and quantity of materials; or
      b) As approving departures from details furnished by Engineer.

2) APPROVED AS NOTED: Work may proceed, provided it complies with Contract and changes shall be made by Contractor. Re-submission is not required, and the work may proceed, but the Contractor shall confirm agreement with notes/comments in writing for approval to be valid. The above dispositions will be general, but approval or exceptions noted shall not be construed as:
    a) Permitting any departure from Contract requirements.
    b) Relieving Contractor of responsibility for any errors or omissions, including details, dimensions, and quantity of materials; or
    c) As approving departures from details furnished by Engineer.
3) RESUBMIT: Work recognized as not being able to proceed. Revise submittal in accordance with notations thereon and resubmit without delay.
4) The following dispositions with comments may also be utilized as required:
    a) Nor Approved
    b) Work May Proceed
    c) Do Not Proceed with Work
    d) Make Corrections Noted
    e) Do Not Resubmit
    f) Submit Final Certified
    g) Review Not Required by Contract
5) Handle re-submissions in the same manner as first submittals. On re-submissions, make all revisions and corrections required by Engineer. Direct specific attention in writing to revisions other than the corrections on previous submissions.
6) Failure of any material to pass specified tests is sufficient cause for refusal to consider further samples of same brand or make of that material. Engineer reserves right to disapprove any material or equipment previously proven unsatisfactory in service.
7) Samples of various materials on site, stored or in place may be taken by Contractor for testing. Samples failing to meet Contract requirements will automatically void approval of items tested. Replace such materials or equipment to meet Contract requirements. When tests are required, make only one test of each sample. Samples that do not meet specified requirements will be rejected. Additional testing of samples will be made by Engineer at Contractor’s expense.
8) The Contractor will be allowed to resubmit any rejected submittal only once without incurring the cost of review. If the same submittal rejected for the second time, the cost of the further reviews shall be borne by the Contractor. The Contractor will be charged the amount equal to the actual cost to the Project of re-submittal review.

C. Requirements for shop drawings

1. Shop drawings shall include fabrication details of all equipment to be installed and any other supplementary data required by the Contract or the Engineer.

2. Detail drawings for cribs, cofferdams, falsework, shoring, decking, form work, and for other temporary work and methods of construction the Contractor proposes to use, will be required to be furnished. Such drawings shall be subject to review, but details of design will be left to the Contractor who shall be responsible for the safety and successful construction of the Work. Drawings, the original design for which is the responsibility of the Contractor, shall bear the seal of a Professional Engineer registered in the Commonwealth.

3. Shop drawings shall show design, dimensions, connections, and other details necessary to ensure that the Contract Documents are accurately interpreted. Shop drawings shall show proper connections with adjoining work in detail. Where adjoining work requires shop drawings, such drawing must be submitted for approval at the same time so that connections can be accurately checked.

4. Shop drawings shall establish the actual detail of all manufactured or fabricated items, indicate proper relation to adjoining work and amplify design details of mechanical and electrical equipment in the physical spaces in any structure and incorporate minor changes of design or construction details to suit actual conditions. Where separate sections or trades are involved, shop drawings shall be coordinated and where required by the Engineer shall be submitted in composite form (coordination drawings) clearly designating which trade will perform which work; the words "work by others" will not be accepted.

5. All submittals of materials, equipment, drawings, etc. shall indicate the corresponding number of the section and paragraph of the Specifications and reference to the Contract Drawing sheet numbers under which each of the above are required.

6. The Contractor shall indicate intended use and proposed installation location of submitted material and equipment in order for submittal to be reviewed.

7. In checking shop drawings, Contractor shall verify all dimensions and field conditions and shall check and coordinate the shop drawings with the requirements of all other Sections, adjoining materials or trades whose work is related thereto, as required for the proper and complete installation of the work.

8. If corrections are required by the Engineer, make such corrections, and resubmit the drawings, to Engineer for approval. If corrections are still required, the same procedure shall be carried out until the drawings are acceptable.

9. All items shown on shop drawings shall be clearly identified with their location in the Contract, or by the sheet or detail number in which they appear.

10. Upon completion of the Work the Contractor shall provide Record Drawing as specified withing the Drawings section of these Specifications. Portions of the shop drawings, copies / prints, which are not readable will be rejected.

11. Construction progress photographs shall be taken by Contractor daily and submitted as PDF files at the end of the work week with brief explanation of the work depicted.

REQUESTS FOR INFORMATION

A. Upon discovery of the need for interpretation of the Contract Documents, Contractor shall prepare and submit a Request for Information (RFI). RFIs shall not be used to request approval of submittals, request approval of design changes or substitutions, nonconforming conditions, or requests for changes to Contract schedule and/or Quantities.

1. RFIs shall be issued by Contractor to Engineer. RFIs submitted by entities other than Contractor will be returned with no response.

2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in the work.

B. Include a detailed, legible description of item needing interpretation and/or resolution. RFI shall include the following:

1. Project Name

2. Contract Number

3. Date of RFI

4. Name and Signature of the Contractor's Project Manager

5. RFI Number, numbered sequentially

6. Specification Section number, title, and related paragraphs

7. Drawing number and detail references

8. Field dimensions and conditions

9. The Contractor may offer suggestions and proposals that shall be in full compliance with the Contracts documents and do not impact Contract schedule and/or cost. If Contractor's suggestion(s) impact the Contract schedule or cost, the potential impact shall be stated in the RFI.

10. Contractor's signature

11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe item needing interpretation.

C. Prepare, maintain, and submit a log of RFIs organized by the RFI number containing the following information:

1. Project Name

2. Project Contract Number

3. Name of Contractor

4. RFI number and Revision Indicator (A, B, …)
5. RFI Description
6. Date RFI was submitted
7. Date Response Required
8. Date Response Received
9. Date Closed

D. Response to RFI will be provided no later than five (5) calendar days unless response requires extension of which the Contractor will be notified.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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PROTECTION OF WORK AND PROPERTY

GENERAL

A. Work Included: This Section specifies the general requirements for the temporary protection of work and property during the Contract period.

TEMPORARY PROTECTION

A. Protect the following:

1. Existing mainline, siding, and yard tracks from damage and impacts.
2. Existing railroad culverts, bridges and grade crossings.
3. Existing public and private access paths and utility easements and crossings.
4. Existing railroad ties, rail, turnouts, OTM, bumping posts and signal equipment.
5. Existing railroad rolling stock and railroad equipment within the work area.
6. Existing platforms, buildings and maintenance facilities.
7. Existing track drainage ditch, drainage pipes and drainage structures.
8. Existing on site utility structures

B. After work is properly completed, be responsible for protecting work and for repairing, replacing, and cleaning of damaged work, so that all work is complete at the time of acceptance of the work.

C. Remove all temporary protection and coverings at the completion of the Work.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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SITE PREPARATION

GENERAL

A. Work Included: This Section specifies the following items:

1. Protection: Protection from harm or defacement of trees and other vegetation or objects indicated or designated by Engineer to be preserved. The presumption shall be that any vegetated area not being regarded as part of the work will be preserved. Areas to be preserved shall include those areas shown on the drawings as undisturbed, any areas indicated by Engineer in pre-construction site visit, or any areas identified by other means. The use of plastic orange snow/construction fence shall be used along Massachusetts Coastal Railroad, LLC (MCRR or Railroad) and MassDOT (Owner) ROW to delineate the limit of work on the ROW.

2. Clearing, Grubbing and Trash Removal: Clearing, grubbing, and disposing of all natural materials within the limits of the work including vegetation, bushes, brush, trees, stumps, fallen timber, logs, roots, overhanging branches, and other similar materials. Removal and disposal of abandoned junk, trash, signs, fences, junk cars, bituminous concrete, concrete, metal, and debris of every nature to the satisfaction of the Engineer

3. Removal and Salvage: Removal, disposal, salvage, or other disposition of man-made materials within the limits of the work including precast concrete barriers, slabs and footings, pavements, curbs and gutters, sidewalks, headwalls, walls, and steps, utility service facilities, guardrail and posts, highway and street signs, fences, other miscellaneous structures and site improvements which interfere with construction as indicated by Engineer, and refuse, trash, and debris.

4. Erosion Control System (if needed only as directed by Owner/Railroad): Placing of siltation fence and straw bales or compost filter tubes for erosion and sedimentary control in areas shown on the drawings or as indicated by Engineer. The installation of silt sack catch basin inlet protection in areas shown on drawing or as indicated by Engineer. Contractor shall control offsite transport of sediments, as required.

SUBMITTALS

A. Submit copies of requests for and certificates of severance of utility services to Engineer prior to start of site preparation work.

SILT FENCE

A. Wood or Metal posts for silt fence shall be hardwood stakes a minimum two inches square and five feet long.

B. Silt fence shall be a woven, polypropylene, ultraviolet resistant material that is inert to biological degradation and naturally encountered chemical, alkalis, and acids and with a mesh size sufficient to trap suspended soil particles but allow for the passage of water flow. Materials shall be Beltech 940 Silt Fence, Mirafi 100X Silt Fence, Perma 2130 Silt Fence, or equal.

C. Tie wires for securing silt fence fabric to stakes shall be light gauge metal clips (hog rings) or one-thirty second (1/32) inch diameter soft aluminum wire.

D. Prefabricated commercial silt fence - such as Mirafi Envirofence, Celancese Corp Envirofence, AMXCO Silt Stop, or equal. - may be substituted for a built-in-field fence.

STRAW BALES OR COMPOST FILTER TUBES

A. Straw bales shall consist of straw for outdoor use with a minimum weight of forty pounds per bale, shall be banded with a minimum of two (2) bands of string or nylon cord of sufficient strength to maintain bale integrity, and shall be staked into the ground with a minimum of two stakes per bale.

B. Wood or Metal stakes for straw bales shall be hardwood stakes a minimum of two (2) inches square by four (4) feet long.

C. The compost filter tubes shall be a minimum of twelve (12) inch straw filled tube of flexible netting material. It shall be a machine-produced tube of compacted rice straw that is certified weed free, by a manufacturer. The netting shall consist of seamless, high density polyethylene and ethyl vinyl acetate and contain ultra-violet inhibitors.

D. Stakes shall be applied to the compost filter tubes per the manufacturer’s specifications.

SILT SACK CATCH BASIN INLET PROTECTION

A. Silt sacks shall be made of non-woven polypropylene and shall fit freely suspended inside the catch basin. The filter shall have a polypropylene boot at the top on which the grate rests to hold it in place. A manufactured overflow opening shall be provided near the top of the filter, below the boot. The filter shall have the following properties:

1. Construction Material	Non-woven polypropylene
2. Maximum overflow rate:	>200 GPM
3. Maximum filtration rate:	>50 GPM (Type - S)
4. Absorbent material:	Polypropylene
5. Maximum filtration rate:	>5-8 GPM (Type – O)
6. Boot adapter dimensions:	36” x 36”
7. Nominal depth :	18”

PROTECTION

A. Protect monuments, existing improvements, adjacent property, and facilities from damage.

B. Contractor shall use all necessary precautions to prevent damage to Railroad and Owner or private property and to avoid hazardous exposure and personal injury to workers.

C. Protect existing stone or concrete bounds and monumentation along property lines. Any disturbed bound or monumentation shall be reset by a Registered Land Surveyor at no additional cost to Railroad and Owner.

CLEARING AND GRUBBING

A. Clear materials specified herein within the limits described and remove from the site. Remove stumps and roots completely in excavation areas.

B. Do not start earthwork operations in areas where clearing and grubbing is not complete, except that stumps and large roots may be removed concurrently with excavation.

C. Remove all material generated by clearing and grubbing and tree trimming and other related operations off the site and dispose of in compliance with all applicable laws and regulations.

REMOVAL AND DISPOSAL

A. Remove entirely existing miscellaneous structures and site improvements that interfere with construction within the limits described or as designated by Railroad. Remove walls and masonry construction to a minimum depth of two (2) feet below existing ground level in areas where such items do not interfere with construction.

B. Remove all material generated by removal operations and other related operations off the site and dispose of in compliance with all applicable laws and regulations.

C. All removal and disposal must be done in accordance with applicable state and federal laws.

D. Any element to be removed that performs a safety function – such as fencing and signage – shall not be removed until its safety function is no longer necessary or has been replaced.

E. All materials, deemed not re-useable or salvageable, shall be properly disposed of.

SALVAGE

A. Salvage indicated material or material determined by Engineer to be suitable for reuse, including: grates, frames, other metal castings and miscellaneous parts of inlets and manholes; hydrants, fire alarm posts and boxes; metal light poles; sound pipe and valves; metal fencing; guard rail; highway and street signs and posts shall be delivered to Owner/Railroad.

B. Protect metallic coatings on salvaged items. Remove adhering concrete from salvaged items where required for disposal or directed by Engineer.

C. Repair, or replace with new material, salvaged material damaged or destroyed due to Contractor's negligence.

D. All items designated as "remove" and not relocated as part of this project, and determined to be in salvageable condition by Railroad, shall be delivered to the location specified in the General Notes Plan for each project location.

BACKFILL

A. Backfill and compact trenches and excavations resulting from work under this Section in accordance with Section Excavation of the Technical Specifications.

SILT FENCE AND STRAW BALE OR COMPOST FILTER TUBES INSTALLATION

A. Silt fence and straw bales or compost filter tubes shall be positioned as indicated on the Drawings and as necessary to prevent off site movement of sediment produced by construction activities as directed by Engineer and as shown on the Drawings.

B. Dig trench approximately six inches wide and six (6) inches deep along the proposed silt fence lines. The trenches are to be used for the anchorage of the fabric.

C. Drive stakes at the back edge of trenches at a spacing as indicated on the drawings. Stakes shall extend a minimum of eighteen (18) inches into undisturbed ground.

D. Hang four by four (4"x4") woven wire mesh on posts, setting the bottom of the wire in the bottom of the trench. Secure the wire to the posts.

E. Hang filter fabric on wire carrying to bottom of trench with a minimum of four (4) inches of fabric laid across the bottom of the trench. Stretch fabric taut along the fence length and secure with tie wires eighteen inches on center both ways.

F. Backfill trench with excavated material and tamp.

G. Install a single row of straw bales or compost filter tubes, as indicated on the Drawings, against the siltation fence and stake with a minimum of two (2) stakes per bale and per manufacturer's minimum stake for compost filter tubes. Place straw bales or compost filter tubes around existing down-stream catch basins in the vicinity of the project as indicated by Engineer.

H. Furnish, place, and maintain silt fence and straw bales as shown on the Drawings and in areas where a need is indicated by Engineer. Remove upon completion of all work. The removal shall include the entire assembly including stakes, silt fence, wire, straw bales, an all other elements of the system. All material will be disposed of off-site in accordance with all applicable laws and regulations. Restore the disturbed area to its previous grades and condition.

SILT SACK CATCH BASIN INLET PROTECTION INSTALLATION

A. Silt sacks shall be installed prior to construction, at the same time that hay bales and silt fence are installed. Silt sacks shall be inspected after each rain event and damaged sacks shall be replaced as approved by the Resident Engineer. Sacks that have filled with debris but remain functional shall be cleaned and reset into the catch basin.

B. When work is being conducted on the catch basin the silt sack shall be removed, cleaned, and temporarily stored until the drainage structure work has been completed, at which time the silt sack shall be either reset or removed, as applicable to the finished function of the structure.

C. Material collected in silt sacks is considered solid waste and must be disposed of in accordance with these Specifications.

D. Silt sacks shall be removed and disposed at the conclusion of the work on the project or as directed by Engineer.

MAINTENANCE AND INSPECTIONS

A. Inspections: Contractor shall make a visual inspection of all sedimentation control devices at least once per week and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to offsite areas, Contractor shall promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly. Maintain stockpiles on site of siltation fence, straw bales or compost filter tubes, stakes, and repair kits so that repairs can be made without any delay in obtaining the necessary materials.

B. Maintenance:

1. Silt Fences and Straw Bales or Compost Filter Tubes
   a. Remove accumulated sediment in the vicinity of the silt fence once it builds up to one-half inch of height. Dispose of the sediment off site in compliance with all applicable laws and regulations.
   b. Replace damaged fabric with new fabric or patch it with section of new fabric with a two (2) foot minimum overlap. Anchor the new fabric in place.
   c. Make other repairs as necessary to ensure that the fence or compost filter tubes are filtering all runoff directed towards it.
   d. Replace straw bales or compost filter tubes when they are saturated with silt or otherwise damaged or ineffective. Dispose of used straw bales off site in compliance with all applicable laws and regulations.
2. Silt Sack:
   a. Contractor to inspect and maintain silt sack inlet protection;
   b. Damaged silt sacks shall be replaced by Contractor as his own expense.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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EROSION AND SEDIMENTATION CONTROL

GENERAL

A. This Section specifies installing straw bales or compost filter tubes and silt fences for the control of erosion and sedimentation on site.

B. Straw bale siltation barrier shall consist of straw bales/silt fence or compost filter tubes as detailed in the Contract Documents.

PRODUCT DELIVERY, STORAGE, AND HANDLING

A. The silt fence fabric shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure prior to placement.

B. Each roll of fabric or erosion control mat shall be labeled or tagged to provide product identification sufficient for field identification, as well as inventory and quality control purposes.

C. Each roll of fabric shall be stored in a manner that will protect them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof cover.

D. Straw bales or compost filter tubes shall be stored in a manner that will protect them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof cover.

MATERIALS AND EQUIPMENT

A. Straw bales or compost filter tubes shall be individually banded and staked into the ground.

1. Straw bales or compost filter tubes shall consist of straw for outdoor use banded with wire or nylon cord (minimum two bands per bale or equal per compost filter tube) and shall be staked for securing into the ground as shown on the Drawings.

2. Stakes for straw bales shall be standard steel pickets, 2 inch by 2 inch wood stakes, or approved equal.

3. The compost filter tubes shall be a minimum of 12” straw filled tube of flexible netting material. It shall be a machine-produced tube of compacted rice straw that is certified weed free, by a manufacturer the netting shall consist of seamless, high density polyethylene and ethyl vinyl and contain ultra-violet inhibitors.

4. Stakes shall be applied to the compost filter tubes per the manufacturer’s specifications.

B. Silt fence shall consist of a self or wire supported geotextile silt fence with support posts

1. Fibers used in the manufacture of geotextiles, and the threads used in joining geotextiles by sewing, shall consist of long chain synthetic polymers composed of at least 85% by weight polyolefins, or polyesters.

2. Both the geotextile and threads shall be resistant to chemical attack, mildew, and rot.

3. Geotextiles shall conform to the following physical requirements in accordance with the acceptance criteria required by ASTM D4759. Values shown are minimum average roll values. Strength values are in the weaker principal direction.
    a. Tensile Grab Strength: ASTM D4632; 90 pounds minimum.
    b. Elongation at 50% Minimum Tensile Strength: ASTM D4632; 50% maximum for self-supported fences.
    c. Permittivity: ASTM D4491; 0.0 10 per second minimum.
    d. Apparent Opening Size (AOS): ASTM D4751; 0.84 millimeters maximum.
    e. Ultraviolet Degradation: ASTM D4759; at 500 hours exposure, 70% strength retained for all cases.

4. Posts for Silt Fence: Either wood, steel, or synthetic posts may be used. Posts shall have a minimum length of 30” plus burial depth and be of sufficient strength to resist damage during installation and support applied loads.

5. Wire Support: 12-gauge wire supports at 6-inch maximum spacing each way shall be used when geotextile fabric is not strong enough to support applied loads as specified. Provide hog ring supports as detailed.

6. Prefabricated fence systems may be used provided they meet all of the above material requirements.

C. Silt sack catch basin inlet protection shall fit freely suspended inside the catch basin.

1. Silt sacks shall be made of woven polypropylene filter fabric with polypropylene boot at the top on which the grate sits to hold the silt sack in place.

2. A manufactured overflow opening shall be provided below the boot, just under the grate.

3. The silt sack filter shall have the following properties:
    a. Constructed of woven polypropylene fabric
    b. Maximum overflow rate of 200 GPM/SF.
    c. Maximum permeability of 1.5 sec $^{-1}$
    d. Minimum UV resistance @ 500 hrs. of 90%
    e. Minimum tensile grab strength at 165 lbs. (ASTM 4632)

TEMPORARY EROSION CONTROL

A. Method of stripping vegetation shall be such as to minimize erosion. Fills shall be placed and compacted in such a manner that soil sliding and erosion is minimized. Grading shall be done in such a manner as not to divert water on to the property adjoining the construction site without expressed written permission of the land owner and the local Conservation Commission. If

Contractor fails to employ adequate and acceptable erosion control techniques during construction, Engineer may order a suspension of the work until implementation of satisfactory techniques are agreed upon and demonstrated, and Contractor shall have no claim for damages or time extension resulting from such delays.

B. Staked straw bales/silt fences and/or compost filter tubes shall be installed at the following locations:

1. Toe of embankment construction.
2. Toe of abutments/retaining walls and temporary earthwork stockpiles.
3. Across construction ditches prior to entry into any drainage system or waterway.
4. Toes of temporary earthwork stockpile.
5. Other locations shown on the Contract Drawings or designated by Engineer.

C. Abut straw bales or overlap compost filter tubes to form a continuous barrier. Silt Fence shall be entrenched 4” minimum as shown in the Drawings. Secure bales or compost filter tubes in place with two stakes per bale.

D. Silt fence construction shall be adequate to handle the stress from sediment loading. Geotextile at the bottom of the fence shall be buried a minimum of 6 inches deep in a trench as shown on the drawings so that no flow can pass under the barrier. Trench shall be backfilled and the soil compacted over the geotextile. Fence height shall be as shown on the drawings, but in no case shall exceed 30 inches above ground surface. Geotextile shall be spliced together only at a support post with a minimum 6-inch overlap. Posts shall be spaced as indicated on the Contract Drawings. Where a 12 inch depth is not possible, the post shall be adequately secured to prevent overturning of the fence due to sediment or wind loading.

E. Sediment controls shall be in place prior to any soil disturbing activities including, but not limited to grubbing and cleaning, earthwork, dewatering, and excavation.

F. Any disturbed soils shall be stabilized, either permanently or temporarily, within 2 weeks of disturbance.

G. Staked straw bales or compost filter tubes shall be placed at the toe of ballast in all excavation areas adjacent to existing track. Straw bales or compost filter tubes in these areas shall be inspected daily for any defects and repaired immediately.

H. Catch basin inlet protection silt sacks shall be placed to protect all catch basins with in the work area that will be receiving any construction area runoff drainage.

MAINTENANCE AND CLEANUP

A. Maintain the integrity of staked straw bale barriers and silt fences as long as they are necessary to contain sediment runoff. Promptly repair or replace ineffective silt barriers and fences while the barrier is still necessary.

B. Inspect all temporary silt fences immediately after each rainfall and at least daily during prolonged rainfall. Any deficiencies shall be immediately corrected. Make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt barriers are properly located for effectiveness. Where deficiencies exist, additional silt barriers and erosion control measures shall be installed as directed by Engineer.

C. Sediment deposits shall either be removed when the deposit reaches approximately one-half of the height of the silt fence or a second silt fence shall be installed as directed by Engineer. Sediment shall be removed and disposed of periodically from behind the straw bales or compost filter tubes. In no case shall the accumulated sediment be allowed to rise above the mid height of the bale. All sediment shall be disposed of in an approved manner.

D. Silt barriers shall remain in place until Engineer directs that they be removed. Upon removal, remove and dispose of any excess silt accumulations, dress the area to give a pleasing appearance, and vegetate all bare areas with approved seed mix.

E. Straw bales or compost filter tubes, silt fences, and stakes will remain the property of Contractor, may be re-used at other locations provided the materials meet the requirements, and shall be removed and disposed of upon acceptance of the respective work unless directed otherwise by Engineer.

F. Inspect all silt sack inlet protection immediately after each rainfall and at least daily during a prolonged rainfall.

G. Sediment deposits in the silt sack shall be removed when the deposit reaches one inch (1”) below the overflow opening in the filter. Remove silt sack from catch basins, empty and rinse out the filter. Reshape the silt sack and re-install into the catch basin.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

EXISTING SITE UTILITIES

DESCRIPTION OF WORK

A. Work Included: This Section specifies the maintenance, support, protection, relocation, reconstruction and adjustment-to-grade, restoration, and abandonment of existing utilities affected by the construction work.

B. For the purpose of this Section, utility means any public or private service, such as electric light and power systems; gas distribution systems; telephone, telegraph, cable television and other communication services; water distribution; storm drain and sanitary sewer services; police and fire communication systems; street lighting and traffic signs and signals; parking meters; and steam distribution systems.

C. Coordination and work between utility companies and Contractor will be required.

GENERAL

A. The location of existing underground pipes, cables, conduits, and structures as shown on the Plans have been collected from the best available sources and Massachusetts Coastal Railroad, LLC (MCRR or Railroad) and MassDOT (Owner) together with its agents does not imply or guarantee the data and information in connection with the underground pipes, cables, conduits, structures and other parts as to their completeness nor their locations indicated. Contractor shall contact utility owners and request marking location of all their lines in the work areas. Contractor shall assume there are existing water, gas, electric and other utility connections to every building and structure, whether they appear on the Drawings or not. Any expense and/or damage to these shall be the responsibility of Contractor.

B. Foundations and lines for services, police and fire alarm boxes, street and pedestrian lights, and traffic signals may not be shown on the Drawings. The appropriate utility companies and/or agencies shall be contacted and consulted for locations of the above.

C. All utility companies, public and private, shall be notified, including those in control of utilities not shown on the Drawings (see Chapter 370, Acts of 1963, Massachusetts) prior to designing, excavating, blasting, installing, backfilling, grading, or restoring pavement. Contractor shall premark the area of excavation or work and notify the Dig Safe Center (1-888-DIG-SAFE) at least three business days prior to any excavation or work. In addition, notification shall be given to all affected private and/or public utilities to permit street marking of their lines.

D. Some unknown utilities may exist in the areas to be excavated. Contractor shall take the necessary precautions when excavated in areas of potential utility conflict. Precautions may include, but are not limited to soil vacuum excavation, hand digging, or other non-destructive means. Contractor shall further be prepared to pre-excavate or pre-trench to locate potential utility conflicts prior to performing such activities as, but not limited to jacking, tunneling, installing temporary excavation support, etc.

E. Interruptions of utilities shall not be permitted without written consent of the utility owner. Contractor shall coordinate with all utilities and provide all temporary utilities and connections to avoid interruptions.

SUBMITTALS

A. Submit working drawings and, if applicable, shop drawings showing the details, procedures, and scheduling for performance of the existing utility work. Show actual location of existing utility facilities; interferences which these facilities present to the new work; location of settlement markers; method proposed to proceed with the construction; details of proposed support systems; and, if applicable, method of testing and procedure for restoration.

B. Submit written evidence of affected utility owners' approval of the details, procedure, and scheduling.

C. Provide written notice two weeks in advance of the intended date to commence operations, to affected utility owners and parties having surface, subsurface or overhead structures in the construction area. Furnish Engineer copies of all notices.

D. If a settlement or movement monitoring system is required, submit copies of readings to Engineer and affected utility owner within 24 hours of the reading.

E. Submit to Engineer, certifications from the respective suppliers that the products to be incorporated in the work are in conformance with applicable requirements.

NOTIFICATION

A. Notify the appropriate utility agencies and Engineer at least 48 hours prior to starting any work involving or adjacent to utility service facilities.

B. Where an existing utility facility is encountered that is not indicated or that is determined to be a different utility facility than that indicated, promptly notify the Authority. Contractor is responsible for determining the owner of the facility and the disposition of the facility.

PRODUCTS

A. Products and materials shall be as specified in the Construction Specifications or by the utility company.

SALVAGE MATERIAL

A. Reuse materials designated to be salvaged, provided they are inspected and approved by the respective utility owner and Engineer. Salvaged material not designated for reuse or returned to utility owner shall become the property of Contractor.

B. Maintain and have available for inspection by Engineer a detailed record, including signed vouchers and receipts, of new and salvaged materials received from, used, or returned to the various utility owners.

EXECUTION

A. Conform to the specifications and standard practices of the affected utility owners. Coordinate with utility owners, which work shall be done by Contractor and which work shall be done by utility owner at Contractor's expense. Ensure continuity of all existing utility services to all users except when the utility owner determines that temporary interruption is required.

B. Unless otherwise indicated or authorized in writing by Engineer, maintain all utility facilities complete in place.

C. Abandoned Facilities

1. Demolish and remove abandoned utility facilities in conflict with work.

2. Do not undertake demolition or removal of the service until written approval for such work has been obtained from the utility owner.

3. When abandoned facilities are indicated to be left in place, plug, or cap or bulkhead the ends of conduits and pipes, as indicated. Pipe or conduit greater than 15-in in diameter shall be completely filled with Controlled Density Fill. Remove abandoned utility manholes, junction boxes, and similar structures to a minimum depth of two feet below finish grade and fill the remaining void with sand or select fill, as specified in Section EARTHWORK, after the plugging, or capping, or bulkheading of conduits and pipes has been completed. Puncture or break the bottom slabs of manholes and similar structures to provide drainage. Backfill and compact excavations resulting from removal of utility facilities, as required.

4. Bulkheads for pipes greater than 15-in in diameter shall be constructed of solid concrete masonry bricks or solid concrete masonry blocks with full mortar joints. The bulkhead shall be watertight. Recess the bulkhead 1/2-in and seal with non-shrink grout.

D. Provide, install, and maintain all temporary facilities required to provide interim utility service when a utility facility is to be relocated and when a utility facility to be replaced is abandoned prior to replacement.

E. Where an existing utility facility is encountered which is not indicated, or which is determined to be a different utility service than that indicated, promptly notify Engineer who will assist in determining the owner of the facility and the disposition of the facility.

F. If, upon exposure, the condition or location of a facility to be supported complete-in-place is found by Engineer to be unsafe for support or for maintenance of service, replace or reconstruct the facility as required, with prior approval of Engineer and the utility owner.

SETTLEMENT OR MOVEMENT

A. Provide suitable settlement or movement monitoring systems where indicated or required by the affected utility owner.

B. In case of settlement or other movement which might cause damage, take immediate remedial measures to correct the conditions and damages caused by the settlement.

RECONSTRUCTION AND ADJUSTMENT-TO-GRADE

A. Relay, reset, or otherwise reconstruct miscellaneous structures and facilities as indicated.

B. Adjust-to-grade manholes and inlets as indicated, by raising or lowering the upper portion thereof.

C. Backfill under utilities supported or exposed using controlled density fill to allow for the proper support and compaction under the utility. Contractor shall coordinate with the utility owner to determine the acceptability of the use of controlled density fill and shall work with the owner to develop alternate means to ensure the proper backfill and compaction under the utility.

AS-BUILT UTILITY LOCATION AND CONDITION SURVEY

A. For each new or relocated utility installed, including those installed or relocated by others in the Project Area, perform an as-built location survey by coordinates prior to backfilling the excavation.

B. The survey data shall be obtained by Global Positioning Survey (GPS) and certified by a Professional Land Surveyor registered in Massachusetts.

C. A complete digital base plan shall be provided in AutoCAD DWG format Release 2000i or later on a Compact Disk (CD), properly referenced to the coordinate system established in the contract. The following standards shall be applicable:

1. Text: Text shall be drawn using a STYLE of "L100-XX" (where XX refers to the plotted scale) and a font file of "SIMPLEX" as defined in the AutoCAD survey template provided by Engineer. The style shall be defined as a "fixed height" style, and have a height of 0.10 times the drawing plotted scale. (i.e. 4.0 for 40 scale plan, 2.0 for 20 scale etc.).

2. Precision and Accuracy:
    a. Horizontal Survey:
        1) Precision: Horizontal control and surveyed points shall maintain a minimum precision of 1:10,000.
        2) Accuracy: No more than 10% of the survey points shall be in error by more than 1/100 inch or 0.25 mm when viewed at the requested scale.
    b. Vertical Survey:
        1) Precision: Vertical Control shall have a maximum error of closure no greater than .075 feet or .02 meters.
        2) Accuracy: No more than 10% of elevations when interpolated from a Surface shall be in error of more than 1/2 a contour interval.

3. Surface Data: The data format shall conform to Autodesk Land Development Desktop Project files. If Contractor uses a different software product to create a surface, then the surface must be represented as a TIN (Triangulated Irregular Network) of 3D lines on a separate, distinct layer within the AutoCAD drawing file. 3D faces or 2 dimensional lines are NOT acceptable.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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DEMOLITION

GENERAL

A. Work specified under this Section includes demolition work identified on the Contract Documents and identified as follows:

1. Demolition and removal of existing track and at-grade crossing material.
2. If found, removing below-grade construction, such as old foundations or buried equipment.
3. If found, disconnecting, capping or sealing, and removing site utilities.
4. Salvaging items for reuse by Massachusetts Coastal railroad, LLC (MCRR or Railroad) and MassDOT (Owner).

MATERIALS OWNERSHIP

A. Unless otherwise indicated, non-track related demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to MCRR (Railroad) and MassDOT (Owner) that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

SUBMITTALS

A. Schedule of Demolition Activities: Indicate the following:

1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services and railroad yard operations.
3. Shutoff and capping or re-routing of utility services.

B. Inventory: Submit a list of items to be removed and salvaged to Railroad and Owner prior to start of demolition.

PROJECT CONDITIONS

A. Track and at-grade crossing to be demolished will be free of all trains and coaches and their use discontinued before start of the Work.

B. On-site storage or sale of removed items or materials is not permitted.

C. Construction Access and Staging

1. Special attention shall be given to sequence demolition staging work so that operations are not affected with respect to safety, operation and schedule.

2. All non-track materials removed as part of this demolition shall become the property of Contractor and are to be disposed of properly according to applicable local, State and Federal regulations, unless otherwise specified by Engineer.

COORDINATION

A. Arrange demolition schedule so as not to interfere with MCRR, MBTA (CapeFlyer) or CSX operations.

PREPARATION

A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving yard facilities as directed by Engineer.

1. Arrange to shut off indicated utilities with utility companies.

2. Cut off pipe or conduit a minimum of twenty-four (24) inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

B. Salvaged Items: Comply with the following:

1. Clean salvaged items of dirt and demolition debris.

2. Store items in a secure area until delivery to Railroad and Owner.

3. Transport items to storage area designated by Railroad and Owner.

4. Protect items from damage during transport and storage.

PROTECTION

A. Existing Facilities: Protect adjacent walkways, yard track, platforms, loading docks, station or building entries, other building facilities, culverts, and other structures during demolition operations. Maintain exits from existing buildings.

B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Railroad and Owner and Authorities Having Jurisdiction (AHJ).

2. Provide temporary services during interruptions to existing utilities, as acceptable to Railroad and Owner and authorities having jurisdiction.
    a. Provide at least seventy-two (72) hours' notice to occupants of affected station or buildings if shutdown of service is required during changeover.

C. Temporary Protection: Erect temporary protection, where required by authorities having jurisdiction and as indicated.

1. Protect adjacent buildings and facilities from damage due to demolition activities.

2. Protect existing site improvements, appurtenances, and landscaping to remain.

3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

4. Provide protection to ensure safe passage of people around demolition area and to and from occupied portions of adjacent buildings and structures.

5. Limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

D. Remove temporary barriers, protections, and bracing where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

DEMOLITION, GENERAL

A. General: Demolish indicated items completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.

2. Maintain fire watch during and for at least four (4) hours after flame cutting operations.

3. Maintain adequate ventilation when using cutting torches.

B. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, platforms or other adjacent occupied or used facilities without permission from Railroad, Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

2. Use water mist and other suitable methods to limit spread of dust and dirt.

C. Explosives: Use of explosives is not permitted.

DEMOLITION BY MECHANICAL MEANS

A. Salvage: Items to be salvaged are indicated on the Site Plan, Scope of Work, and as directed by the Railroad.

B. Below-Grade Construction: Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending five (5) feet outside footprint indicated for new construction. Abandon below-grade construction outside this area.

1. Remove below-grade construction, including foundation walls, signal foundations, and footings, to at least depths indicated by Railroad.

C. Existing Utilities: Abandon existing utilities and below-grade utility structures.

SITE RESTORATION

A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

REPAIRS

A. Promptly repair damage to adjacent buildings, utilities, fences, culverts, or other structures caused by demolition operations.

DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and legally dispose of them in location acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

REUSE OF SALVAGING ITEMS

A. All existing track material should be removed and handled as directed on the Contract Drawings, Scope of Work and Special Conditions.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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EXCAVATION AND BACKFILL

GENERAL

A. Work Included: This Section specifies the following items.

1. Preparing subgrades for subballast, ballast and track.
2. Excavating, backfilling and compacting for subballast, ballast and track.
3. Disposal of excess excavated material will be along the railroad right-of-way within five (5) miles of the work site at a location(s) designated by Engineer.
4. Placement and compaction of ballast. The placement of subballast or ballast for the base course shall be in accordance with the Contract Drawings, Scope of Work, AREMA Recommended Practices, and the MassDOT MW-1 except as modified herein. Crushed stone shall be installed only in areas directed by Engineer.
5. Placement of flowable compacted fill in utility trenches and other areas as directed by Engineer.

RESPONSIBILITY OF CONTRACTOR

A. Contractor shall be responsible for adhering to regulations, specifications, and recognized standard practices related to soil and rock excavation during excavation and removal activities. MCRR (Railroad) and MassDOT (Owner) will not be responsible at any time for Contractor’s violation of pertinent state or federal regulations or endangerment of laborers or others.

B. It is the responsibility of Contractor to protect all existing utilities within the Contract Limits. Coordination with the various utility companies shall be required for the protection of these lines as stated within these Contract Specifications.

C. Contractor shall be responsible for all costs associated with protection, repair, or relocation of utility lines within the Contract Limits.

PREPARATION

A. Protect structures, track structure, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation operations.

B. Preparation of subgrade including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section Site Preparation of the Technical Specification.

C. Protect and maintain erosion and sedimentation controls when needed, which are specified in Section Site Preparation and Section Erosion and Sedimentation Control of the Technical Specifications, during excavation operations.

EXPLOSIVES

A. Explosives: Do not use explosives.

EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include bituminous and cement concrete sidewalks and roadways, bricks and cobbles, old ballast, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

STORAGE OF SOIL MATERIALS

A. Temporary Stockpiling of excavated old ballast and soil material within the yard in the area designated by Railroad is acceptable until material is reused or disposed of along railroad Right-of-Way. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

B. Stockpile soil materials away from edge of excavations.

C. Do not store within drip line of remaining trees.

MATERIAL TRANSPORT

A. All soils transported on and along track shall be loaded by Contractor into properly licensed and permitted hi-rail vehicles.

B. Hi-rail trucks used to transport the materials shall be constructed and loaded so as to prevent any of the load from dropping, sifting, leaking, or otherwise escaping during transport. All trucks shall be equipped with tarps or other substantial type covers which shall be used to prevent any materials from spilling during transport.

EMBANKMENT FILL

A. Existing excavated materials shall be used as embankment fill.

B. Plow, scarify, bench, or break up railroad Right-of-Way sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Where possible, place excavated material on subgrades free of mud, frost, snow, or ice.

GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from track and to prevent ponding. Finish subgrades to required elevations.

DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Contractor shall remove unsatisfactory waste material from excavated material, including trash, and debris, and legally dispose of it off the site.

B. Surplus: If surplus of satisfactory excavated material exists, Contractor is to dispose of the material within the railroad Right-of-Way as directed by Engineer.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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TIMBER CROSSTIE

GENERAL

A. These Specifications describe requirements for the procurement of timber crossties to be used on the rail lines owned by the Massachusetts Department of Transportation (MassDOT or Owner). Crossties shall meet, in every respect, Specifications of the American Railway Engineering and Maintenance-of-Way Association (AREMA) contained in the Manual for Railway Engineering, Specifications for Timber Crossties, Chapter 30, Sections 3.1.1.4 and 3.7.5, and these specifications.

B. Crossties sizes covered in this Specification include: seven inches deep by nine inches wide by eight feet six inches long (7” x 9” x 8’-6”); seven inches deep by nine inches wide by nine feet long (7” x 9” x 9’); and seven inches deep by nine inches wide by ten feet long (7” x 9” x 10’).

GREEN LUMBER

A. Crossties shall have a maximum of 1” wane allowed in the rail bearing area (RBA). A maximum of twenty percent (20%) of the entire quantity of ties ordered may be seven inches (7”) by eight inches (8”) in cross-section with no wane allowed in the RBA. Dimensions specified (depth, width, length and cross-section) are minimum dimensions. Crossties measuring more than 1” deeper, wider or more than 3” longer, at any point, than the specified dimensions shall be rejected.

B. No undersize ties will be allowed for track construction using resilient fastener tie plates. Crossties shall be 8’6” in length**.**

C. Switch timbers shall be 7 inches by 9 inches in cross section with no wane allowed and shall be in lengths as shown on the Contract Drawings.

D. Ties shall be manufactured from sound, live timber and must be free from any defects that may impair their strength or durability as crossties as further described in this section. Every effort should be made to get the felled timber to mill and milled timber to treatment facility for seasoning as quickly as possible, to avoid wood fiber infection.

E. Crossties shall be a minimum of 90% oak with the balance from the following species: Beech, Birch, Cherry or Hard Maple.

F. Switch ties shall be 100% oak.

G. All ties shall be straight, well sawn on four sides, cut square at the ends, have top and bottom parallel and have bark completely removed. A tie will be considered straight when a straight line along the top, from the middle of one end to the middle of the other end, is entirely within the tie and when a straight line along a side, from the middle of one end to the middle of the other end, is everywhere more than 1-1/2 inches from the top and bottom of the tie. The top and bottom will be considered parallel when any difference in the thickness at the sides and ends is less than or equal to 1/2 inch. Ties shall be free from the following defects:

1. Decay - Ties that show decay of any nature and ties that show strain from being left in the log too long will be rejected. “Blue stain” is not decay and is permissible in any wood.

2. Holes - Ties will be rejected if a large hole, or numerous holes with the net effect of a large hole, is present. A large hole is one exceeding 1/2 inch in diameter and 3 inches deep within the RBA*, or more than one-fourth the width of the side on which it appears and 3 inches deep outside the RBA.

3. Knots - Ties with a large knot, or numerous knots with the net effect of a large knot within the RBA* will be rejected. A large knot is one whose average diameter is greater than one-third (1/3) the width of the surface on which it appears.

4. Shake – A split is a separation of the wood extending from one surface to an opposite or adjacent surface. Do not count the end as a surface when measuring the length of a split. In unseasoned cross ties, a split no more than 1/8 inch wide and/or 4 inches long is acceptable. In seasoned cross ties, a split no more than 1/4 inch wide and/or longer than the width of the face across which it occurs is acceptable.

5. Checks – A check is a separation of the wood due to seasoning which appears on one surface only. Do not count the end as a surface. Ties with continuous checks whose depth in a fully seasoned and/or treated tie is greater than 2 inches in thickness and longer than 48 inches in length of the tie will be rejected.

6. Split - A tie will be rejected if a split exceeds 5 inches long or ½ inch wide.

7. Slanting Grain - A tie will be rejected if a slant in grain in excess of 1:15 is present, except in the case of woods with interlocking grain.

8. Wane - Excessive wane (defined as 1” and/or as specified by AREMA Chapter 30) will be cause for rejection of the tie.

   * Rail Bearing Area – (RBA) – The area of the tie between 20 inches and 40 inches from its middle.

G. Anti-splitting gang nail end plates shall be installed on both ends of 100% of the green crossties prior to seasoning. End plates will be applied by a mechanical device capable of squeezing crosstie ends together to eliminate any splits and restore the crossties to their original, milled dimensions prior to application. End plates to be manufactured from 18-gauge hot-dipped galvanized steel plate, with nail teeth at least 3/8 long capable of penetrating oak to their full depth. End plates shall be 6” x 7” and centered on the ends of the crossties. End plates shall be embossed along the plate on both 7” sides in letters a minimum of one-eighth of an inch (1/8”) in height. Embossing shall include the following:

1. Massachusetts Department of Transportation – MADOT

2. The last two digits of the year treated – 16

3. Crosstie producer’s name or symbol – XX Co.

H. The identification brand on the end plate should appear as: MADOT-16-XXCo. and shall be positioned along the plate on the 7 inch side.

SEASONING

A. Crossties shall be air seasoned prior to treatment. Ties shall be stacked for seasoning in accordance with AREMA Manual of Railway Engineering, Volume 1, Chapter 30, Article 3.5.6.2. Seasoning shall continue for at least 12 months and no more than 18 months.

B. In the absence of air seasoned crossties, the Boulton drying process may be used. If the Boulton process is used, conditioning should continue until moisture removal rate indicates a percent moisture retained equal to a 12 month air dried crosstie, but not less than 45 percent by weight.

C. A minimum of 20 borer cores per treatment charge shall be taken of seasoned ties to determine that adequate drying has taken place.

D. The borer cores shall be taken mid-way between the ends and mid-way between the top and bottom surfaces of the tie. Three 3-inch borer cores shall be taken to determined moisture content.

PRESERVATIVE TREATMENT

A. Prior to treatment, anti-splitting plates must be checked by the treating facility to ensure that plates are firmly imbedded in the tie. If plates are found to be loose or not flush against the end of the tie, plate shall be firmly pressed against the tie before treatment begins.

B. Cross tie treatment shall be to retention of seven pounds or to refusal of 60/40 creosote coal tar solution per cubic foot of timber in accordance with the AREMA Manual, Specifications for Treatment, Section 3.7.2.1.2, Empty Cell Process.

C. A minimum of 20 borings shall be taken per charge after treatment to determined proper penetration.

INSPECTION OF CROSSTIE

A. Crossties must be inspected as specified in the AREMA Manual for Railway Engineering, Volume 1, Chapter 30, Part 3. Inspection and testing shall be done in accordance with AREMA Specifications prior to crosstie shipment by an individual or individuals with a minimum of five (5) years of experience inspecting and certifying the manufacture and treatment processes of timber crossties.

B. Inspections protocols will be conducted as follows:

1. Green crossties shall be inspected and certified at the time of delivery, prior to seasoning. Dry ties will be subject to inspection after seasoning and before treatment.

2. Seasoned crossties will be subjected to inspection, prior to treatment, by examination of the top, bottom, side and end faces of each crosstie. Crossties are to be graded independently, not in association with other lots.

3. Seasoned crossties shall be inspected by taking a minimum of twenty (20) boring cores per treatment charge to determine if the specified drying level has been achieved. Boring cores shall be taken midway between the ends of the crosstie. Three inch (3”) diameter boring cores shall be taken to evaluate moisture content.

4. Anti-splitting plates that are found to be loose or not firmly against the end of the tie will be cause for rejection of the tie.

5. Following treatment, crossties shall be inspected for specified treatment solution penetration by taking a minimum of twenty (20) boring cores per treatment charge.

6. Inspector will make a close examination of the top, bottom, sides and ends of each tie. Each tie will be graded independently without regard for the grading of the others in the same lot. Ties covered with ice, or too muddied for ready examination, will be rejected. The responsibility and expense for the inspection described above will be borne by the manufacturer.

7. Treated crossties will be inspected upon delivery and prior to installation by Contractor.

SUBMITTALS

A. Prior to shipment of crossties to Contractor, the crosstie manufacturer shall submit inspection reports certifying that all required tests and inspections (by inspection protocols) have been made and that the crossties being shipped to Contractor are in full compliance with AREMA specifications and as specified herein.

SHIPMENT

A. Crossties shall be bundled in groups of twenty-five (25) pieces per bundle in a configuration of five (5) rows of five (5) on edge. Bundles shall be banded using a minimum 2-inch heavy duty steel bands per bundle.

B. Switch Timbers shall be bundled in groups of twenty (20) pieces of 9 to 14 foot lengths and 15 pieces of 15 to 17 foot lengths per bundle, in a configuration of five (5) rows of four (4) on edge. Bundles shall be banded using a minimum 2-inch heavy duty steel bands per bundle.

C. Bundles of crossties shall be placed atop wood dunnage on the bottom of the transportation vehicle and between tiers to facilitate unloading.

CONDITIONS OF ACCEPTANCE

A. Crossties that do not fully meet the requirements of these Specifications shall be rejected, removed from MassDOT property (if rejected following shipment) and replaced at no additional costs to MassDOT. Cause for rejection shall include, but not be limited to: under-dimension crossties (seasoned and treated crossties must measure a minimum of 7” x 8” and comprise no more than 20% of the total population in the order); the balance of the population (seasoned and treated) must be no more than 1/4” under-dimension from nominal size (7” x 9”); crossties not meeting straightness criteria or having excessive (relative to specified) checks, splits, wane, knots, etc.; any damage to crossties occurring during transport and/or handling prior to acceptance by MassDOT. Improperly applied or loose anti-splitting devices are also grounds for rejection if they are not repairable (at the crosstie supplier’s expense) to the satisfaction of MassDOT. Any crossties rejected by MassDOT shall be segregated from the rest of the order and arrangements made by the supplier to band them in bundles for return and replacement.

MEASUREMENT AND PAYMENT

A. Separate measurement and payment will not be made for work under this section, but all costs in connection therewith shall be included in the total Contract Lump Sum price for the Force Account Work.

END OF SECTION

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DISTRIBUTION AND INSTALLATION OF CROSSTIES

CROSSTIE SPACING

A. New crossties shall be installed at a nominal crosstie spacing of 19-1/2”, or as directed by the MassDOT (Owner’s) Authorized Representative or MCRR (Railroad)

CROSSTIE PLACEMENT

A. New crossties shall be installed perpendicular to the centerline of the track and in-line with the existing ends of crossties on the line side. The distance from the end of the crosstie to the field side of the base of rail on the line side shall be 18-1/2” ±1/2”. The line side for tie installation shall be the right rail headed north.

SPIKING PATTERN

A. Each newly installed crosstie shall be spiked in accordance with the MassDOT MW-1, Section 127.1 part A and 127.2, part A. Contractor shall ensure that the minimum specified number of spikes is installed on all new and existing ties in tangents and curves.

CROSSTIES INSTALLED AT JOINTS

A. Joint ties shall be installed so that spikes will not be driven within 2” of the ends of joint bars. Spikes shall not to be driven in the slots of slotted joint bars.

CROSSTIES INSTALLED AT INSULATED JOINTS

A. At locations where spikes shall be installed at insulated joints, rail holding spikes shall be installed backwards (bill of the track spike facing away from the insulated joint). Tie plates shall not be installed directly underneath the center of insulated joints. A minimum of 3” of clearance is required from the edge of a tie plate to the centerline (insulation post) of the insulated joint.

TAMPING AND DRESSING OF BALLAST

A. Contractor shall tamp all newly installed crossties so they rest firmly against the base of the rail prior to the installation of the tie plate. In addition, all crossties not designated for replacement shall be tamped by Contractor as part of the tie installation process.

B. Tamping of all crossties shall not lift existing track and existing track geometry shall be preserved. All crossties are to be tamped sufficiently as to not allow any vertical rail deflection under train load at the conclusion of each work shift.

C. The ballast must be dressed and broomed so the cribs are filled and a defined shoulder exists.

TRACK GAGE

A. All new crossties shall be installed with 56-1/2" (±1/8") gage. The Gager should be on at all times while the Spiker is in operation.

B. Contractor shall use of a steel track gage is during the installation of crossties.

C. Crossties that are not replaced shall have 56-1/2" (±1/8") gage. If it is determined that it is necessary to remove existing spikes in crossties not designated to be changed in order to meet gage transition requirements set forth in MBTA MW-1, Section 53.1, Paragraph D, the following shall apply:

1. All crossties to be re-spiked as part of the gaging process shall be plugged with a Railroad approved plugging compound by Contractor before re-spiking.

2. Gaging work in this contract shall be incidental to installation of crossties.

USE OF A LIQUID PLUGGING COMPOUND

A. Contractor shall use a Railroad approved chemical formulation for plugging crossties not designated for replacement. Such compound shall have the equivalent or greater characteristics of the Willamette Valley Company SPIKEFAST® ES-50 RM formula. It is Contractor's responsibility to ensure that the plugging compound is being applied in a manner that is consistent with the chemical manufacturer's instructions. Spike holes shall be filled in completely with the approved plugging compound. Furnishing and installing liquid plugging compound for all work in this contact shall be incidental to installation of crossties/timber.

FINISHED CROSSTIE CONDITIONS (FOR FINAL INSPECTION AND PAYMENT)

A. The following items must be completed by Contractor in order for payment to be made for tie installation work:

1. Renewed crossties shall be installed complete with new track spikes and relay plates as required. Track shall be ballasted, tamped, regulated and dressed.

2. A minimum of 6" of ballast shoulder beyond the end of tie, even with top of tie, then sloped at 2:1 or conforming to existing shoulder as directed by the Owner's Authorized Representative or Railroad.

3. All ballast shall be removed from the top of crosstie, base of the rail, and track plates and finish no higher than the top of tie and no lower than 1" below top of tie following installation of crossties.

4. Each new crosstie, as well as all other ties in track, shall be carefully mechanically tamped (multiple squeezes may be required) as part of the tie installation process.

5. Tamping of all crossties shall not lift existing track nor allow any vertical rail deflection under train load at the renewed crosstie or existing crosstie locations at the conclusion of the work shift.

6. Existing track geometry shall be preserved.

7. Field shoulder of the tie plate shall be tight up against field side of running rail.

8. Crosstie and tie plate shall be perpendicular to the running rail.

9. Tie plates shall be centered on the crosstie. Plate overhang over the edge of the crosstie is not permitted.

10. Track gage shall be 56 ½” +/- 1/8”.

11. Spikes in new crossties shall be driven down to 1/8” to 3/16” above the rail base.

12. All spikes on existing crossties shall be driven down to 1/8” to 3/16” above the rail base.

13. No spike heads will be allowed under base of rail or base of joint bars. Spike heads shall be adjusted accordingly.

14. No ballast allowed between base of rail and tie plate.

15. No ballast allowed between the tie plate and top of crosstie.

16. Anchors shall be reapplied to new tie if the tie being replaced had anchors. Anchors shall be tight against both sides of the crosstie.

17. All of the above items are considered to be incidental to the installation of crossties.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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FURNISH AND INSTALL BALLAST

GENERAL

A. This Section specifies the testing and furnishing of Track Ballast.

B. Related work includes Section Final Surface and Align Track of these Technical Specifications.

C. The Contractor shall employ an independent, certified laboratory, acceptable to Massachusetts Coastal Railroad, LLC (MCRR or Railroad) and MassDOT (Owner), to perform the specified testing of the ballast stone.

QUALITY ASSURANCE

A. Submittals will be reviewed for general conformance with the intent of the Contract Documents. This review will not relieve Contractor of final responsibility for the means, methods, procedures, and sequences to be utilized.

B. Submit name and location of proposed ballast supplier.

C. Submit name and qualifications of testing laboratory.

HANDLING

A. Load ballast only into rail cars or trucks, which are in good order, tight enough to prevent leakage and waste of material, and clean and free from rubbish or any substance that would foul ballast.

B. Handle prepared ballast at production plant, during shipment and at work site so that it is kept clean and free from segregation. Do not make repeated passes of equipment over same level in stock pile area.

QUALITY CONTROL

A. Ballast Production Site Testing

1. Notify Engineer of proposed source and location of crushed stone ballast no less than 5 days prior to shipment of any ballast to the work site. Engineer shall observe the taking of samples of proposed material and the testing of them for conformance to classification, quality, and grading requirements. Samples of ballast for testing shall be taken from each 500 tons of prepared ballast. Sample shall be representative and shall weigh not less than 150 pounds.

2. Contractor will notify Engineer of test results. Failure of ballast to meet the requirements of this Specification shall mean rejection of ballast quarry.

3. Ballast material shall be approved in writing by Engineer prior to commencing work site delivery.

4. If, during ballast installation, the source of ballast changes, Contractor shall immediately notify the Engineer and perform tests of new production site in accordance with these Specifications. Ballast shall have the same or higher classification, quality, and grading as former ballast used. Work site delivery shall not commence until the Engineer has approved, in writing, the new ballast source.

B. Ballast Job-Site Testing

1. Periodically during progress of trackwork, Railroad or Owner will test samples of ballast obtained from in-place locations designated by the Engineer to ensure a uniform quality of ballast.

2. If ballast in-place does not conform to requirements of these Specifications Engineer will notify Contractor to stop further loading of ballast until fault has been corrected and to dispose of defective material without cost to Railroad or Owner.

3. Engineer reserves the right to reject any load of ballast arriving at work site for unloading that does not conform to this specification. The load shall be disposed of without cost to Railroad or Owner.

MATERIALS TO BE FURNISHED BY THE CONTRACTOR (PER SPECIAL CONDITIONS)

A. Ballast shall conform to AREMA Size No. 4 per AREMA Chapter 1, Part 2, Table No. 1-2-2 as modified by these specifications.

B. Ballast shall be crushed, quarried, washed stone conforming to the current AREMA Specification Chapter 1, Section 2 and as modified in this section.

C. Ballast Quality Requirements:

1. Deleterious Substances. The amount of deleterious substances present in prepared ballast shall not exceed the following limits, when using test methods specified herein.

	Percent By Weight	Method of Test
Soft and Friable Pieces	3.0	ASTM C142
Material Finer Than No. 200 Sieve	0.5	ASTM C117
Clay Lumps	0.5	ASTM C142

2. Flat or elongated particles having a length equal to or greater than five times the average thickness of the particle shall not exceed five percent by weight of the total when visually inspected.

3. Water absorption shall not exceed 0.4 pounds per cubic foot when tested in accordance with ASTM C127.

4. Percentage of wear, when tested in the Los Angeles abrasion machine in accordance with ASTM C535, grading No. 2, shall not exceed 18 percent.

5. Soundness of the prepared ballast shall be such that when tested in the sodium sulphate soundness test in accordance with ASTM C88, weighted average loss shall not exceed 1.5 percent after 10 cycles of test.

6. Cementing value of the ballast shall not exceed an average value of 320 pounds per square inch for five specimens when tested in accordance with the Logan Walter Page Method (U.S. Department of Agriculture, Bulletin No. 347, 1916, Pg. 15) except as modified as follows:
    a. A sufficient amount of pea size pieces of the rock, amounting to about 500 grams (1.1 pounds) is revolved in Los Angeles Abrasion Cylinder with three cast iron balls 4.76 cm. (1.875 inch) diameter and weighing approximately 0.43 kilograms (0.95 pounds) at the rate of 30 and 33 revolutions per minute, and the stiff dough at room temperature resulting from about 500 grains (17.64 oz.) of dust screened through a 100 mesh sieve, mixed with sufficient water, thoroughly kneaded for five minutes, allowed to stand in an air tight container for two hours, is molded into cylindrical briquettes 2.54 cm. (1 inch) diameter by 2.54 cm. (1 inch) in height under a pressure of 132 Kgs. per sq. cm. (1877.5 pounds per square inch), after which they are dried for 20 hours in air at room temperature, 4 hours in a hot air bath at a temperature of 100˚C (212˚F), then cooled for 20 minutes in a desiccator and immediately tested in a compression testing machine for static crushing strength, the bearing heads being suspended by pivots to secure uniform distribution of load, which is applied at 600 pounds per minute, approximately.

7. Determine ballast weight per cubic foot in accordance with ASTM C29.

8. Ballast samples shall be obtained in accordance with ASTM D75.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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GENERAL TRACK CONSTRUCTION

GENERAL

A. This Section specifies general information and requirements concerning track construction on Massachusetts Coastal Railroad (MCRR or Railroad) and MassDOT (Owner) railroad property. For this project, track construction includes the following:

1. Construction of new Ballasted Track

2. Installation of timber crossties

3. Re-alignment, surfacing and tamping of existing tracks

B. The approximate limits of the above types of track construction are defined on the Contract Drawings and described in the Scope of Work.

APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards and publications shall apply to the Contract, except as they may be modified herein, and are hereby made part of these Specifications to the extent required.

1. American Railway Engineering and Maintenance Association, Manual for Railway Engineering, latest edition, herein referred to as the AREMA Manual.

2. American Railway Engineering and Maintenance Association, Portfolio of Trackwork Plans, latest edition, herein referred to as the AREMA Portfolio.

3. MBTA Railroad Operations Book of Standard Plans.

4. MassDOT MW-1 Specification for Construction and Maintenance of Track.

QUALITY ASSURANCE

A. Contractor shall perform all measures necessary to assure quality of the Work. This shall include source quality control and field quality control requirements.

B. Contractor shall be experienced in the construction of the various types of trackwork included in this Contract. Such experience shall have been gained on at least three previous contracts of similar volume of work with other North American transit properties or railroads.

BALLAST

A. Ballasted track and special trackwork therein shall be constructed using AREMA No. 4 ballast in accordance with the Special Conditions.

B. The ballast shall be constructed to the cross-sections indicated on the Contract Drawings and as described in the Scope of Work.

PLACEMENT OF BALLAST

A. Compact the finished subgrade prior to installation of ballast. Distribute and compact a six inch (6”) layer of bottom ballast uniformly over the finished subgrade prior to tie distribution. Distribute and compact bottom ballast in three inch lifts uniformly over the finished subgrade. Total bottom ballast shall not exceed six inches (6”). Each bottom ballast layer shall not exceed four inches compacted depth. The finished grade of the compacted bottom ballast shall be two inches (2”) below bottom of tie final grade, plus or minus one inch (+/- 1”).

B. Thoroughly compact ballast until stones are firmly interlocked and surface is true and unyielding. Compact ballast using vibratory compactors of either the roller or pad type. Dynamic force for either type shall not be less than 20,000 pounds and the frequency range shall be 1100 to 1500 vpm. Use machines equipped with a governor which can be set and locked to control rate of impulse. Provide a tachometer or other suitable device for accurately checking the frequency of vibration during the compacting operation.

C. Top surface of initial layers of ballast shall be smooth, flat and uniformly compacted prior to distributing ties.

DISTRIBUTION OF WOOD TIES

A. Carefully distribute and properly space ties on initial layer of ballast. Space all cross ties at 19 1/2” on center, except space ties at 18” within grade crossings. Tie spacing at turnouts may be adjusted to preserve switch timber spacing, but in no case should the maximum spacing between ties exceed 24 inches. There should be at least 10 wood ties in every 20 feet of track.

B. Place timber ties so that heartwood is down. Do not adze ties unless approved. Handle treated ties in a manner to avoid breaking and bruising. Do not throw ties from cars or trucks onto rails or rocks.

C. Place ties normal to centerline of track unless shown otherwise on Contract Drawings or as directed by Railroad. Properly space and align ties prior to rail installation. In placing or spacing treated ties, handle only with tongs or suitable devices. Do not use chisels, forks, mauls, picks, punches, shovels, or sledges for moving ties or placing them in position beneath rails. Avoid unnecessary handling, redistribution, and reloading of ties. To extent practical, distribute ties in proper position for use without further handling.

TIE PLATES

A. Timber crossties shall have tie plates installed under each rail. As an alternate to the process described below, Contractor may use pre-plated ties, as long as the final trackwork meets the requirements stated in the following sections.

B. Prior to installation of tie plates, clean contact surfaces to allow proper bearing of tie plate on tie and rail on tie plate.

C. Locate centerline of tie plates on 8 feet 6 inch ties so that the line side of the tie is properly located from outer edge of base of rail. Tie plate shall be centered on the crosstie under rail.

D. Locate tie plates on longitudinal centerline of each tie and place square to centerline of rail so that outside shoulder of plate bears fully against rail base. Place plate with the downward cant toward center of track.

E. Secure rail on line end of ties to tie, in proper relation to tie end, before securing opposite rail. Use line rail as reference in securing opposite rail to proper gauge.

TIE PLATE - RESILIENT FASTENER

A. Timber crossties shall have tie plates installed under each rail.

B. Prior to installation of tie plates Contractor shall:

1. Install liquid tie plugging compound in holes where spikes have been pulled from timber ties.
2. Install liquid tie plugging compound into tie per manufacturer recommendations, and to the approval of the Engineer before installing tie plates or installing new spikes or screw spikes.
3. Clean contact surfaces to allow proper bearing of tie plate on tie and rail on tie plate.

C. Install Resilient Tie Plates and new rail section:

1. Identify the line rail and remove the rail, plates and OTM OPPOSITE the line rail designated for rail replacement for that section. Do not remove more rail and/or OTM than can be safely replaced prior to an end of shift return to service.
2. Place new resilient plates on tie and seat new rail in new plates approximate final installation location.
3. Accurately gage new rail and plate assembly from existing line rail at 56 ½”.
4. Fasten new resilient plate using two plate holding cut spikes.
5. Bore and install screw spikes as described below.
6. Clip rail to newly installed plates as described below.

7. Repeat procedure on line rail, accurately gaging from newly installed rail.

D. Tie Boring

1. Field bore crossties and switch timber before fastening tie plates

2. Holes in crossties shall be 5/8 inch diameter and 6 inches deep for 15/16 inch screw spikes.

3. Location and number of holes shall conform to location and number of screw spikes. Boring of holes in excess of numbers required will not be permitted.

4. Do not bore holes entirely through tie.

5. After drilling, brush drill chips from top surface of tie.

SCREW SPIKES

A. Start and install screw spikes vertically and square with rail. Install spikes straight.

B. Screw spikes shall be set and driven in accordance with manufacturer’s recommendations and specifications.

C. Straightening screw spikes will not be permitted.

D. Number of screw spikes used per tie shall conform to Contract Drawings and Specifications.

E. Avoid removal of screw spikes once driven. When necessary, pull spikes and plug hole using liquid tie plug.

F. Under no circumstances shall gauge be adjusted by striking lags, spikes, or plate edge after it is fixed to tie.

G. Seat rail properly between tie plate shoulders. With outside base of rail tight against outside plate shoulder.

RAIL CLIPPING

A. Install clip as specified by manufacturer and as shown on Contract Drawings and Specifications.

B. Install two clips per tie per rail.

C. Clips shall not be overdriven.

TRACK SPIKES

A. Cut spike shall be new 5/8” x 6” reinforced throat duck bill with 6” under the head and conform to MBTA Railroad Operations Book of Standard Plans, Drawing 1210, MBTA Commuter Rail Material Specification No. 9212 and AREMA Manual for Railway Engineering Chapter 5, Part 2.

BOLTED JOINTED RAIL

A. Standard bolted joints shall be in accordance with the Contract Drawings, Scope of Work and Special Conditions.

B. Standard bolted joints on opposite rails shall be staggered a minimum of four ties.

C. Compromise bolted rail joints shall be staggered a minimum of fifteen feet (15’) when the height difference between the connecting rail sections is less than one-half inch (1/2’). When the height difference between the connecting rail sections exceeds one-half inch (1/2’), the opposite rail joints shall be within the same crosstie crib. Compromise bolted rail joints shall not be located on a crosstie or rail plate.

D. All bolted rail joints shall have a gap between 1/8” and 3/16”.

RAIL ANCHORS

A. Rail anchors shall be of the drive on type designed to properly fit and hold the designated rail section. Rail anchors shall conform to AREMA Manual for Railway Engineering, Chapter 5, Part 7 for functional design.

B. Rails shall be anchored in accordance with MassDOT MW-1, Section 125. Rail anchors shall not be installed in grade crossings within the limits of rail seal or manufactured crossing system unless specified by the manufacturer.

ADJUSTMENT AND REPLACEMENT OF RAIL ANCHORS

A. Rail anchors are to be re-installed on all new crossties and switch timbers when the crosstie or switch timber being replaced was anchored. Unusable or damaged anchors shall be replaced with new anchors designed for the rail section being anchored. Rail anchor installation shall be in accordance with current AREMA and MassDOT MW-1 Standards.

B. Crossties and switch timber shall be box anchored and anchors shall be fully engaged with the rail base with full bearing against both sides of the crosstie or switch timber. All requirements of these Technical Specifications with respect to Track Gage, Material, Tie Installation and Finished Track Condition following tie installation shall apply to rail anchor installation. Rail anchor restoration/installation for all work in this contract shall be incidental to work of installation of crossties/switch timber.

SURVEYING REQUIREMENTS

A. Employ a qualified surveyor to perform the survey required within the project limits and assume full responsibility for all dimensions and elevations taken and the setting of lines and grades relating thereto.

B. Furnish and place markers for the control points and reference points of the track centerlines, as needed to build worked track to its designated alignment and surface. A minimum of six control points must be established for installation of the switches.

C. Maintain control points and reference points for the duration of the work.

HI-RAIL CONSTRUCTION EQUIPMENT

A. Contractor shall submit a list of hi-rail construction equipment to be used to perform trackwork including weights and dimensions. The equipment will not be permitted on MassDOT property until it has been approved.

B. Contractor shall verify that his track-mounted or hi-rail equipment complies with the standards set by the AAR Mechanical Division.

C. Operate only equipment in a good state of repair and with all safety appliances and protective devices in place and functional.

D. Rail wheels with flat spots of length exceeding 8 percent of the wheel diameter are prohibited. Any equipment with a wheel with a flat spot exceeding 5 percent of the wheel diameter is restricted to a maximum speed of 10mph on bridges.

E. Contractor’s equipment shall not exceed the design loads for any track or structure. Contractor shall verify that proposed equipment meets these requirements.

F. Contractor’s equipment shall physically clear all fixed obstructions within the limit of the project, including signal and power installations. Any damage caused by Contractor will be repaired or replaced as determined by the Railroad at no additional cost to Owner.

TRACK GAGE

A. Track gage shall be 56-½” +/- 1/8” measured at a right angle to the rail from inside face to inside face of the rails between points 5/8-inch below the top of rail. If the track gage of adjacent, existing ties and switch timber vary outside the 56-3/8” to 56-5/8” range, then gage of adjacent, existing ties and switch timber must be adjusted to conform to the limits given above. Any gage transition into existing conditions must be approved by MCRR (Railroad) or MassDOT (Owner’s) Authorized Representative. It is mandatory that Contractor run the spiker with the gage function on.

TRACK GEOMETRY

A. Track shall be constructed in conformance with the Contract Drawings, Scope of Work, AREMA Recommended Practices and the MassDOT MW-1.

B. For tangent track the alignment is to be based on each centerline of track, equidistant between the gauge sides of the running rails.

C. For curved track, the alignment is to be based on the centerline of track with the outside rail located 2 feet 4-1/4 inches radial from the centerline measured in the plane of the rails.

D. Track gauge shall be measured as specified for Gauge, Track under Definitions. Gauge shall be 4 feet 8-1/2 inches.

E. Rail Cant:

1. Ballasted track shall be constructed with rail cant at 40 to 1 inward inclination of the rails.

2. Rail in special trackwork shall be constructed with no cant.

F. Superelevation:

1. Primary track curves shall be superelevated as shown on the Contract Drawings.

2. Elevation, or superelevation, is the vertical distance of the outer rail of a curve above the inner rail. It is provided to overcome or partially overcome the effects of curvature and speed. Superelevation shall be as shown on the plans. Tangent track shall not be superelevated, except as provided in the paragraph below.

3. Superelevation shall be attained gradually and uniformly over the length of the spiral or as indicated. Superelevation shall change no more than one inch (1”) in 62 feet. Full elevation shall be achieved at the start of the body of the curve - if necessary up to one inch may be run off in tangent track. The outer rail shall be superelevated above the inner rail; the inner rail shall be at the required profile.

4. Spirals - The superelevation at the point of tangency shall be zero and shall increase uniformly through the length of the spiral to full elevation of the outer rail at the spiral-to-curve point. This spiral shall be provided at the ends of simple curves and segments of compound curves as measured in the field.

5. Turnouts and crossovers shall not be superelevated, unless specifically noted on the plans.

6. Prior to final surfacing, brass tags attached to the ties shall be used to mark the beginning and ending points of superelevation and shall be located at 1/4 inch increments between the beginning and ending points of the superelevation transition. Tags shall be placed to be read while facing along the track excepting the tag at full elevation which shall be placed to read facing the high rail, to plainly indicate the authorized full elevation. The amount of superelevation shall be as indicated on the plans.

G. Track Surface:

1. Track surface is the relationship of opposite rails to each other in profile and cross level. Track profile is the running surface along the top of the grade rail. Cross level is the difference in elevation of the tops of heads of opposite rails measured at right angles to the track alignment. The ideal surface is a uniform profile consisting of straight gradients connected by vertical curves, with zero cross level on tangents and predetermined cross level on curves.

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TRACK CONSTRUCTION TOLERANCES

A. The track construction tolerances shall be as specified in Table I below.

TABLE I

TRACK CONSTRUCTION TOLERANCES

Gage	
Variation from requirements of section Track Gage	± 1/8-inch
Difference in 62'	1/8-inch
Cross Level:	
Variation from zero at any point in tangent track	± 1/8-inch
Variation from computed value in spirals and curves	± 1/8-inch
Rate of change of permissible variation from requirements of section Track Geometry shall not exceed	3/16-inch in 62 feet
Horizontal Track Alignment: (1) (2)	
Maximum deviation from tangent or permissible variation from uniform curvature on curves shall not exceed	±1/4-inch
Rate of change of permissible variation shall not exceed	3/16-inch middle ordinate to a 62-foot chord on curves, and 1/16-inch middle ordinate to a 62-foot chord on tangent
Vertical Track Profile: (1)	
Rate of change of permissible variation shall not exceed	1/8-inch middle ordinate of a 62-foot chord

NOTES:

(1) Measured on the line rail. Use either rail as the line rail on tangent track, except that the same rail shall be used for the full length of the tangent. Use the outer rail as the line rail on curved track.

(2) Total deviation in station areas to be ±1/8 inch vertical and ±1/4 inch horizontal to insure ADA/MAAB compliance.

SURFACING AND ALIGNING

A. Contractor shall distribute sufficient top ballast to tamp and raise reconstructed siding and yard tracks to match the profile of the proposed finished top of rail grade. Top of rail shall be within ½” of proposed final top of rail grade for all tracks/rails with specified final grades on contract plans.

B. At the conclusion of the track construction, Contractor shall perform surface and alignment of all tracks within the project limits using approved on-track equipment.

C. Surface and Lining of all tracks must meet FRA Class 2 Geometry and all switch turnouts must meet FRA Class 5 Geometry. Surfacing and lining with a non-production machine is permissible provided that it is done under the direction of a surveyor and approval of Railroad.

D. Following this work, Contractor shall perform Quality Control (QC) work to correct track defects created by the surfacing and lining work. QC corrections will address defect both with existing and newly installed ties and include high spikes, tie plates not centered, plate shoulder or other object (stone, spike head, etc.) bearing under rail base, and down ties.

E. Both sides of all switches shall be surfaced, lined and tamped. Track surface shall be run out at least 100 feet beyond switches and the ends of the re-alignment areas or as directed by Railroad.

F. Following the completion of surfacing, lining and tamping, Contractor shall plow/sweep remaining ballast so that all track is completely swept, all cribs are filled to at least 1” below top of tie, no ballast remains on the top of ties, and all areas outside switches are smooth and level.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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FINAL SURFACE AND ALIGN TRACK

GENERAL

A. At the conclusion of the Project's associated trackwork, Contractor shall perform surface and alignment of all tracks within the project limits using approved on-track equipment. A surfacing lift of 1" to 2" shall be made to completed track to meet final track profile.

B. A production Mark IV Tamper or approved equal is required for this work.

C. Surface and Lining of all tracks must meet FRA Class 2 geometry criteria.

D. Surface and Lining of all turnouts, at-grade crossings and 100' at-grade crossing approaches must meet FRA Class 5 geometry criteria.

E. Following this work, Contractor shall perform Quality Control (QC) work to correct track defects created by the surfacing and lining work. QC corrections will address defects and include high spikes, tie plates not centered, plate shoulder or other object (stone, spike head, etc.) bearing under rail base, and down ties.

F. Both sides of all switches and at-grade crossings within work limits shall be surfaced, lined and tamped. Track surface shall be run out at least 100 feet beyond switches and the ends of the re-alignment areas or as directed by MCRR (Railroad).

G. Following the completion of surfacing, lining and tamping, Contractor shall plow/sweep remaining ballast so that all track is completely swept, all cribs are filled to at least 1" below top of tie, no ballast remains on the top of ties, and all areas outside switches are smooth and level.

MEASUREMENT AND PAYMENT

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END OF SECTION

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WELDING OF RAIL

GENERAL

A. The work specified in this section shall include the fabrication of continuous welded rail (CWR) strings and all other welding of running rail, including testing, inspection, transportation of rail and CWR, and qualification of welding and welders. Rail welds shall be of two types:

1. Electric Flash-butt Welds: Tee rail for tracks outside the limits of special trackwork shall be welded into continuous strings using the electric flash-butt welding process.

2. Thermite Welds: Thermite welds shall be used only where it is impractical to perform Electric Flash-butt Welds, usually in the following locations: joining continuous welded rail strings; joining rails of different rail sections (compromise welds).

B. Electric Flash-butt welding may be performed using either a fixed electric flash-butt welding plant or a mobile welding machine designed for rail welding.

C. Electric flash-butt welds may be substituted for thermite welds, where applicable.

REFERENCE STANDARDS

A. American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering, Vol. 1A, Chapter 4, Part 3:

1. Section 3.10 - Specification for the Quality Assurance of Electric-Flash Butt Welding of Rail

2. Section 3.11 - Specification for Fabrication of Continuous Welded Rail

3. Section 3.12 – Inspection and Classification of Secondhand Rail for Welding

4. Section 3.13 - Specification for the Quality Assurance of Thermite Welding of Rail

B. American Society for Testing and Materials (ASTM International):

1. ASTM E164 – Standard Practice for Contact Ultrasonic Testing of Weldments

2. ASTM E1032 - Standard Test Method for Radiographic Examination of Weldments

3. ASTM E709 - Standard Guide for Magnetic Particle Testing

C. American Welding Society (AWS) D1.1 Structural Welding Code - Steel

D. American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A Personnel Qualification and Certification in Nondestructive Testing

E. Massachusetts Department of Transportation (MassDOT) MassDOT MW-1 – Recommended Practice for the Maintenance of Track and Special Trackwork

SUBMITTALS

A. General:

1. Ultrasonic inspection procedure, equipment description and calibration methods and procedure for dry powder magnetic particle inspection.
2. Magnetic particle and ultrasonic inspection records for each weld.
3. Inspection records of each weld for straightness as per AREMA requirements.
4. Daily calibration of ultrasonic inspection equipment.
5. Certification of ultrasonic and magnetic particle test personnel.
6. Testing Laboratory: Employ an independent testing laboratory which shall perform all indicated weld testing.
7. Quality Control procedures to be followed.

B. Electric Flash-butt Welds:

1. A list of all equipment and calibration methods, method of rail end alignment, method of rail straightening, and a schedule of lengths of rail strings to be fabricated. The schedule of lengths of rail strings shall include the location of any insulated joints within the string.
2. Welding Machines Performance: Submit Electric Flash-butt welding machine performance standards as provided by the manufacturer. During welding production, a recorder shall be attached to each welding machine to record platen movement and current impulses on the form "Record of Field Welds", a copy of which is attached to the end of this Specification. A record of machine performance for each weld shall be submitted to the Design Engineer. If the record indicates performance which is not in conformance with the approved standards, the weld will be considered defective and shall be rejected.
3. Details of the equipment and procedure proposed for straightening welds if required.

C. Thermite Welds:

1. The method and procedure specified shall comply with that of the weld kit manufacturer and shall include the name of the manufacturer and details of the operations. The manufacturers recommended procedure for welding high strength rail if different from requirements for standard rail.
2. Submit detailed procedure specification of the step-by-step methods to be employed in making the welds for review and approval by Engineer. Include complete description of each of the following items:

a. Manufacturer’s trade name for the welding process.

b. Method used for cutting and cleaning the rail ends.

c. Minimum and maximum allowable rail gap between ends prior to welding.

d. Methods used for cleaning multiple-use crucibles and removing moisture, and the procedures for tracking the number of welds made. Cleaning methods and moisture removal procedures for single-use crucibles are not required.

e. Method used for pre-heating, including time and temperature.

f. Method used for removing the upset metal and finishing the weld to the final contour, including am description of special tools and equipment.

g. Quality control procedures.

3. Submit welder qualifications and certification from weld-kit manufacturer for Engineer’s approval.

4. Record of Thermite Welds: Maintain a complete and current record of all thermite welds and their locations.

QUALITY CONTROL

A. Rail Straightness: Check rail for end straightness before welding. Examine both ends and tops of all rails using a 3 foot metal straightedge. Deviations from straight shall be measured with a metal taper gauge. Rails which are at or exceed the tolerances in AREMA Chapter 4, Part 2, Specifications for Steel Rails, Sections 2.1.13.1.c through 2.1.13.1.e shall not be welded.

B. Qualification of Testing Technician: Testing shall be performed by a technician certified to have met ASNT procedure SNT-TC-1A, Level II or III qualifications.

C. Field Testing: Production flash-butt and/or thermite welds shall be visually, magnetic particle and ultrasonically tested in the field for defects in accordance with paragraphs D and E below. Visual testing will be in accordance with AREMA standards. Any rail weld showing surface cracks will be rejected.

D. Magnetic particle testing shall be performed in accordance with ASTM E709. Testing shall be conducted with the rail temperature below 800oF. Acceptance Criteria: Particles shall form a regular longitudinal pattern indicating homogeneity of the weld and freedom and defects, surface irregularities and internal discontinuities.

E. Ultrasonic Testing:

1. Ultrasonic inspection of welds shall be performed in accordance with ASTM E164. Prior to testing of welds, the technician certified in accordance with ASNT procedure SNT-TC-1A, Level II or III shall be tested to ensure his ability to detect defects in rail. The test shall be conducted with the calibration rail as specified below serving as the test specimen. The technician shall locate all the holes in the calibration rail by ultrasonic testing. This test will be observed by an independent technician, certified in accordance with ASNT procedure

SNT-TC-1A, Level II or III and experience in ultrasonic examination of rail welds. Failure to pass this test will result in the disqualification of the technician.

2. The following equipment shall be used for ultrasonic testing:
   a. Ultrasonic, pulsed echo, instrument normally used for inspection of rails with calibrated decibel gain control of minimum 2db increments, operating in the range 1-5 MHz, with CRT screen and scale. Equipment shall be capable of detecting a 3/64-inch discontinuity 6-1/2 inches below top of rail.
   b. Calibrated paper tape recording attachments to record accurately the CRT screen indications when a non-complying weld is located.
   c. 2.25 MHz angle beam transducers 1/2" x 1" at 70 degrees and 45 degrees.
   d. Suitable high viscosity couplets of good wetting characteristics.
   e. Standard IIW calibration blocks of rail steel for primary reference response and to construct distance-amplitude correction curve, and DSC Blocks of rail steel for calibration checks.
   f. A "calibration rail", a piece 136RE rail, 18 inches long with a 3/64-inch diameter round bottom hole 6-1/2 inches below top of rail and in which other 1/8-inch diameter flat bottom hole patterns have been drilled.

3. Incorporate the following in the test procedure:
   a. Scanning level shall be +20 dB minimum.
   b. Scan the rail in a zigzag pattern twisting probe, on one side of the weld only at a rate not exceeding 6 inches per second, so that the full weld is scanned. Each pass will overlap a minimum 10 percent and the scanning is carried out longitudinally to the rail.
   c. Calibrate the equipment at the start and end of each day's work, and at least every four hours during examination, and hourly checks with DSC blocks. If any point on the distance-amplitude curve has been changed by more than 20 percent, all results since last calibration check shall be void and all welds re-examined. If the curve has moved on the sweep line by more than five percent, all non-complying welds since last calibration check shall be re-examined.
   d. When a reflection of greater amplitude than the acceptance criteria is found, scan around the full perimeter of the weld from both sides, to ensure full weld coverage and determination of size, type, and location of discontinuity.
   e. Make permanent trace recording of discontinuity indications.
   f. Paint the rail web at non-conforming welds on both sides across the weld.

4. All welds shall be free from defect or flaw giving a reflected display of greater than 20 percent of distance-amplitude correction curve at calibration level or will be as listed in Table 1.

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TABLE 1
MINIMUM ACCEPTANCE LEVELS (DECIBELS)

WELD THICKNESS (in.) AND TRANSDUCER ANGLE

REFLECTOR	**5/16 TO 3/4**	**3/4 TO 1-1/2**	**1-1/2 TO 2-1/2**		**2-1/2 TO 4**		**4 TO 6**	
SEVERITY	**70°**	**70°**	**70°**	**45°**	**70°**	**45°**	**70°**	**45°**
Large Reflectors	+8	+3	-1	+4	-4	+1	-7	-2
Small Reflectors	+9	+4	+1	+6	-2	+3	-5	0
Minor Reflectors	+10	+5	+3	+8	0	+5	-3	+2

5. Use an ultrasonic test report form that records 20 inspected welds per sheet. The form shall include the location of the weld in track, the results of the ultrasonic inspection including size of defects found in the head, web or base of rail, shape identity and location of all reflections, trace record, the results of the visual inspection, name of inspector, and other information as needed. Welds found defective by ultrasonic, magnetic particle, or visual inspection shall be replaced at no expense to Owner/Railroad.

RAIL FOR CONTINUOUS WELDED RAIL

A. Rail for the Work shall be furnished in accordance with the Special Conditions.

THERMITE WELDING MATERIALS

A. Thermite type rail welds shall be formed utilizing one of the following brands of rail welding kits or an approved equal.

1. Thermit - as manufactured by Orgo-Thermit, Inc., Manchester, New Jersey.

2. Boutet - as manufactured by Railtech Boutet, Inc., Napoleon, Ohio.

B. The rail welding kits used when welding fully heat treated (or head hardened) rail shall conform to the process manufacturer's recommended standard for such work.

PREPARATORY WORK FOR ALL WELDS

A. Rail, which must be cut for any reason shall be cut square and clean by means of rail saws or abrasive, cutting wheels in accordance with AREMA Chapter 4, Part 2, Specifications for Steel Rails. Torch cutting of rails is prohibited. Rail ends not within 1/32 inch of square shall be cut square.

B. Rails shall conform to the AREMA Chapter 4, Part 2, Specifications for Steel Rails, for straightness. Rail ends shall show no steel defects, dents or porosity before welding.

C. Clean rails to be welded of grease, oil, dirt, loose scale, and moisture to a minimum of six (6) inches back from the rail ends, including the railhead surface. Use a wire brush to completely remove dirt and loose oxide, and use oxygen-acetylene torch to remove grease, oil, and moisture.

D. Rails shall be straightened cold in a hydraulic press or roller machine to remove twists, waves, and kinks until they meet the surface and line requirements specified herein before. The method of permanent straightening shall be submitted to Engineer for approval.

E. Rail that cannot be straightened permanently shall be cut back a sufficient distance to achieve the required alignment. Burrs shall be removed. The method of end finishing rails shall be such that the rail end shall not be metallurgically or mechanically damaged.

F. Align the rail ends using a rail beam specifically designed for this purpose or a 36-inch straight edge.

G. Use a power grinder with an abrasive wheel to remove scale, rust, burrs, lipped metal and mill brands which would interfere with the fit of the mold for two (2) inches on each side of the ends. Rail ends shall show no steel defects, dents, or porosity before welding.

FABRICATION OF CONTINUOUS WELDED RAIL (CWR) STRINGS

A. Welded rail strings shall be of the longest lengths practical to fabricate and handle. String length shall not be less than 700 feet except as required by the joint location, etc.

B. The schedule shall indicate which strings or which portions of strings will be high strength rail. The schedule shall indicate which strings or portions of strings will be "A" rails, if applicable.

C. The schedule shall indicate the locations of the proposed field cuts, if any. The rail schedule shall minimize thermite welds between standard rails and high strength rails.

D. No rail string containing "A" rails shall be fabricated until all rail has been received. All "A" rails shall be used in one string, and shall be used in tangent sections of track.

ELECTRIC FLASH-BUTT WELDING

A. Electric Flash-butt welding shall be in accordance with the AREMA Chapter 4, Part 3, Specification for the Quality Assurance of Electric-Flash Butt Welding of Rail and Specification for Fabrication of Continuous Welded Rail except as modified hereinafter.

B. Mismatched or jagged rail ends shall be either sawed or cut with an abrasive rail cutter. Mating rail ends by flashing shall not be accepted.

C. Rails shall have the scale removed down to bright metal in areas where the welding current-carrying electrodes contact the rail. Grind down raised rail brands in electrode areas. The weld and adjacent rail for a distance clearing the electrodes shall be rejected if in the areas of electrode contact there is not more than 95 percent of the mill scale removed. Electrode contact areas shall be examined for evidence of electrode burn. Where metal is displaced or where the oxidized areas exhibit checks or small cracks the weld shall be rejected and the rail cut back clear of the electrode burn.

D. Welds shall be forged to point of refusal to further plastic deformation and shall have a minimum upset of 1/2-inch, with 5/8 inch as standard.

E. If flashing on Electric Flash-butt welds is interrupted, because of malfunction or external reason, with less than 1/2-inch of flashing distance remaining before upsetting, rails shall be reclamped in the machine and flashing initiated again.

F. Whenever possible, grinding shall be accomplished immediately following welding at an elevated temperature. When grinding must be done at ambient temperature, care shall be taken to avoid grinding burns and metallurgical damage.

G. Alignment of rail in the welding machine shall be at the head of the rail.

1. Vertical alignment shall provide for a flat running surface. Any difference of height of the rail shall be in the base.

2. Horizontal alignment shall be accomplished in such a manner that any difference in the width of heads of rails shall be divided equally on both sides of the head. Where the difference, when divided, exceeds 0.040 inches, 0.020 inches of the difference shall be placed on the gauge side and the remaining differences in the width of heads shall be on the field side.

3. In any case horizontal offsets shall not exceed 0.040 inch at the head and/or 0.125 inch at the base.

H. Surface and Gauge Misalignment Tolerances: Shall meet the alignment tolerances given in the AREMA Manual, Chapter 4, Part 3, Specification for Fabrication of Continuous Welded Rail.

I. If, at any time, 7 or more of a series of 12 consecutive welds made on one machine exceed 75 percent of the stated surface misalignment tolerances that machine shall be shut down and adjusted before work continues.

J. Re-welds shall be cut out beyond the heat affected zone of the previous weld.

K. Weld Finishing:

1. A finishing deviation of the parent section of the rail head surface shall not exceed plus 0.010 inch of the lowest rail.

2. The sides of the rail head weld shall be finished to plus or minus 0.010 inch of the parent section. The top and bottom of the rail base shall be finished to within 0.010 inch of the lowest rail.

3. The web zone including the underside of the head, the web, and both fillets on each side, shall be finished to within plus 0.090 inch to plus 0.010 inch of the parent section. Finishing grinding shall eliminate all cracks.

4. Notches created by minor offset conditions, twisted or misshapen rails shall be eliminated by minimal grinding to blend the variations.

5. Fins on the weld due to grinding or shear drag shall be removed prior to final inspection.

L. One handling hole may be made in each end of a CWR string. Rail ends containing such holes shall be cut off during track construction as indicated.

PRODUCTION, INSPECTION, AND TESTING OF ELECTRIC FLASH-BUTT WELDS

A. A chart recorder shall be used to monitor all significant welding parameters. The recorder shall identify each weld in each string. In addition, the rail schedule designation for each string shall be included on the recording with a notation to indicate the beginning and ending of each CWR string. Each recorder employed shall be calibrated daily. Recordings shall become the property of owner at the time the welded rail is released for installation.

B. Inspect all electric flash butt welds by the dry powder magnetic particle method in accordance with ASTM E 709. Subsequently, inspect all electric flash butt welds ultrasonically in accordance with these specifications.

C. Inspect all electric flash-butt welds in accordance with the AREMA Specifications.

D. Defective electric flash-butt welds shall be repaired immediately during production. Other defective weld findings shall be repaired as specified in the Repair of Defective Welds Section of this Specification.

E. Hardness - The hardness of the weld measured on the head of the rail in the center of the weld shall be equal to the Brinell hardness of the parent metal with a tolerance of plus or minus 20 Brinell hardness numbers. Brinell hardness testing shall be conducted only on test welds by an approved Testing Technician.

F. Weld testing shall be carried out by an independent testing laboratory. The testing service and their testing program and procedures are subject to approval as specified herein.

G. The testing service shall certify whether or not each weld meets the quality acceptance criteria detailed and shall submit reports. At the time of testing the testing service shall mark their findings as to acceptability or rejection on the weld itself.

H. Identifying Electric Flash-butt Welds and Rail Strings: At the completion of welding each string of CWR, a record shall be submitted documenting production of the string. Included shall be the heat numbers of the first and last pieces of rail in the string, the number of welds in the string, the heat numbers of rail on each side of welds which have been cut out and re-welded, a record of machine performance for each weld, and reports for all magnaflux and ultrasonic testing. Reports shall be bound in pad or notebook form for ease of handling and retention as permanent record.

THERMITE WELDING

A. CWR rail sections in track shall be joined in the field by thermite welding. Electric flash-butt welds may be substituted for thermite welds.

B. Except at Special Trackwork locations, thermite welds shall not be located within the following location:

1. Within 15 feet of a field weld in the same rail.

2. Within 15 feet from the center of any bolted or bonded (glued) joint.

3. Within 10 feet of a transition from embedded or direct fixation track to ballasted track.

4. Within 5 feet of an electric flash-butt weld.

C. Bolt holes and handling holes shall not be permitted to remain in the ends of the rail to be welded. Rail ends containing such holes shall be cut off during track construction.

D. Preparation of Rail Ends: Rail ends shall be either saw-cut or ground at right angles to the rail to provide a smooth and clean surface. The surface of the rails for a length of approximately 6 inches from the end of the rails shall be cleaned by grinding to remove all grease, dirt, loose oxide, oxidized metal, scale, and moisture. All burrs and lipped metal which would interfere with the fit of the mold shall be removed.

E. Weld Gap: At the time of thermite welding, the rails shall have the rail gap recommended by the manufacturer of the weld kit and shall be aligned to produce a weld which, with respect to alignment, shall comply with the AREMA Specifications. Would the rail gap be larger than the manufacturer's recommended gap after the rails have been adjusted for zero thermal stress, then sufficient rail shall be removed from one or both rails to permit insertion of a rail not less than 19 feet long which shall provide the recommended gaps at each end for field welding. At a location where the rail gap is smaller than the manufacturer's recommended gap, the recommended gap shall be obtained by sawing a piece from one rail.

F. Thermite Weld Pre-heating - The rail ends shall be pre-heated prior to welding to a sufficient temperature and for sufficient time as indicated in the approved welding procedure to ensure full fusion of the weld metal to the rail ends without cracking of the rail or weld.

G. Thermite Weld Post-heating - The molds shall be left in place after tapping for sufficient time to permit complete solidification of the molten metal and proper cooling to prevent cracking and provide a complete weld with proper hardness and ductility.

H. Weld Finish: Rail shears shall be used to trim upset weld metal from the rail after removal of the mold. Trimming and grinding of the weld shall result in the weld being within the following tolerances:

1. The top, field and gauge side of the rail head shall be finished to within plus or minus 0.010 inch of the parent section.

2. Notches created by offset conditions shall be eliminated by grinding to blend variations. Protrusions and gouges in the welded area shall be removed, and the weld area shall be blended into the rail contour by grinding in a manner which will eliminate fatigue crack origins. Defects visible to the unaided eye shall be removed by grinding, except that if

removal by grinding cannot be accomplished without damaging the rail, the weld shall be removed. Grinding pressure which would overheat the rail surface shall not be permitted.

3. Heavy grinding of the weld shall be completed while the weld is still hot from welding.

I. Inspect one out of every 10 thermite welds in standard track and two thermite welds in each item of special trackwork ultrasonically in accordance with AREMA Specification and MassDOT MW-1.

J. Defective thermite welds, as specified in section Defective Thermite Welds of this specification, shall be repaired as specified in section, Repair of Defective Welds of this specification.

K. Inspect all thermite welds utilizing magnetic particle testing procedures, testing only the head of the rail and in accordance with the Quality Control Section of this Specification; applicable AREMA specification sections; and MassDOT MW-1.

DEFECTIVE THERMITE WELDS

A. Defective thermite welds shall be determined as follows:

1. Weld quality, finishing alignment not in accordance with the above mentioned standards.
2. Welds showing a response at any level that is identified as a crack or lack of fusion shall not be acceptable.
3. Welds showing a response that is less than 50 percent of the primary reference level shall be acceptable.
4. Welds showing a response greater than 50 percent but that do not exceed the primary reference level are acceptable, provided that all of the following apply:
   a. The defects are evaluated as slag or porosity.
   b. The largest defect does not exceed 0.180 inch in its largest dimension.
   c. The total area of the defects does not exceed 0.009 square inch.
   d. The sum of the greatest dimension of defects in a line does not exceed 3/8-inch.
5. Welds showing a response that exceeds the primary reference level shall not be acceptable.

REPAIR OF DEFECTIVE WELDS

A. Electric Flash-butt welds rejected during final track inspection or testing by Rail Defect Car shall be cut out and rewelded if possible, or replaced with at least a 19-foot rail welded in its place by two thermite welds in accordance with this specification.

B. Thermite welds rejected during inspection or testing shall be cut out and rewelded if possible, or replaced with at least a 19-foot rail welded in its place by two thermite welds in accordance with this specification.

C. Special Thermite Welds

1. Should a defective thermite weld replacement using an inserted piece of rail and two welds not be practical because of limitations due to adjacent special trackwork parts, Contractor shall cut out the defective weld and replace it with a special wide thermite weld. Prior to use in track this special weld shall be tested and accepted in accordance with applicable AREMA specification sections and MassDOT MW-1.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

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RECORD OF FIELD WELDS

DATE:______________________________

TIME:______________________________

TRACK DESIGNATION:____

LOCATION: STA.______________**TO STA.**_____________**(LT.RT)**

RAIL SECTION:__________**OTHER:**_______________________________

MILL BRAND:____

YEAR ROLLED:__________________**(AHEAD)**_____________**(BACK)**

HEAT NUMBER:__________________**(AHEAD)**_____________**(BACK)**

TYPE OF RAIL: HEAT-TREATED CONTROL-COOLED (CIRCLE)

RAIL CUT REQUIRED:_____**(YES)**__**(NO)**

MANUFACTURE - MACHINE NO. :__________________________________

AIR TEMPERATURE:____

RAIL TEMPERATURE:____

WEATHER CONDITION:____

TRACK ALIGNMENT AND CONSTRUCTION:______________________________
(Curve, Tangent, Grade, Etc.)

NAME OF ENGINEER OR REPRESENTATIVE PRESENT:____________________

NAME OF CONTRACTOR'S FOREMAN PRESENT:__________________________

INSPECTOR:_______________________

INSPECTION

PHYSICAL	VERTICAL	HORIZONTAL	ULTRASONIC	MAGNAFLUX	GRINDING

INSTRUCTIONS: Use “OK” to indicate inspection was made and weld passed for physical, ultrasonic, magnaflux and grinding. Write number in thousands of an inch measured for vertical and horizontal.

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REMOVAL AND REPLACEMENT OF DEFECTIVE TIE PLATES

TIE PLATE INSTALLATION

A. Relay tie plates shall be installed per the Scope of Work and these Technical Specifications. Contractor shall be responsible for having adequate replacement tie plates on hand at all times during tie installation.

B. Plates shall be installed on an even bearing surface to provide proper cant. The plate bearing area of the crossties may be adzed if necessary to provide an even bearing.

C. Contractor shall replace tie plates with relay plates for each new crosstie if:

1. There are missing plates. Existing tie plate is cracked or broken.
2. Existing tie plate is worn to where the base width exceeds 5 5/8”.
3. Existing tie plate does not contain enough spike holes to comply with the required spiking pattern for tie plate location in track.
4. Existing tie plate is within 25 feet from the end of pavement at a public railroad crossing at grade.
5. Existing tie plate is a single-shoulder tie plate within CWR Track Section

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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INSTALLATION OF REPLACEMENT RAIL

REPLACEMENT RAIL

A. Contractor shall be responsible for the replacement of existing corroded or damaged rail at locations designated on the Project Plans and/or as directed by the MCRR (Railroad) or MassDOT (Owner's) Authorized Representative.

B. Rail shall be cut and moved as necessary at the direction of the Railroad or Owner's Authorized Representative.

C. Remove existing joint bars, bolts, spikes, plates and anchors and stockpile for disposal, or re-use, as directed. After removal of existing rail and OTM, plug spike holes in ties with approved liquid plugging compound, prior to plate placement.

D. Contractor shall install relay rail maintaining 1/2 rail stagger, or as directed by the Owner's Authorized Representative or Railroad, using relay tie plates, relay joint bars and spiking pattern as directed. Connect to existing rail at locations identified by the Owner's Authorized Representative or Railroad.

E. Contractor shall be responsible for all cutting and drilling of rail as necessary for installation of relay replacement rail including connections to existing rail. Track gage of installed replacement rail to be 56-1/2" +/- 1/8".

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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GRADE CROSSING (RUBBER RAIL SEAL)

GENERAL

A. The work specified in this Section consists of furnishing and installing Rubber Rail Seal and hot mix asphalt grade crossings. Rubber Rail Seal shall be installed on both gage and field side of rail at locations indicated on the Contract Plans or as Directed by the Engineer.

B. The Rubber Rail Seal shall provide a flexible seal between the rail and the hot mix asphalt (HMA) surface material. Track structure, including rail, OTM, ties, and ballast must be in excellent condition. Final line, surface, and tamping must be completed prior to the installation of Rubber Rail Seal. This work shall be done at the locations indicated in the contract documents or where directed by the Engineer.

C. The installation of Rubber Rail Seal grade crossings includes:

1. Preparation of the installation site.
2. Construction of at-grade crossing track.
3. Rubber Rail Seal and HMA installation.

The above construction is encompassing and includes all pertinent trackwork related items associated with track construction such as surfacing, lining and gauging and all other operations necessary to construct an acceptable completed track structure.

SUBMITTALS

A. Pre-construction survey plans for review and approval to MassDOT/MCRR for each grade crossing location. The plans are to include, at a minimum: work limits; excavation limits; rail joint locations, proposed track line and grade, proposed road grades, drainage, new conduit location, as well as existing: rail joint locations; track line and grade; road grades; drainage; signaling equipment; street markings, sidewalks and all other pertinent information.

B. Post-construction, hard copy and CAD, as-built plans to MassDOT/MCRR for each grade crossing location upon completion of the work. The as-built plans are to include, at a minimum, final: rail joint locations, track line and grade, road grades, drainage location and means, new conduit location, existing conduit; signaling equipment; street markings, sidewalks and all other pertinent information.

C. Detailed description of construction procedures for the Rubber Rail Seal and asphalt grade crossing to be installed.

D. Brochures and Manufacture’s literature on the Rubber Rail Seal product and installation.

SITE PREPERATION

A. Coordinate with MassDOT/MCRR and all Authority(s) Having Jurisdiction (AHJ) responsible for the crossing for all street and road closures prior to closing. Proper barricades must be placed at all crossings during the time that they are closed to prohibit vehicles from entering the work zone. All state and local regulations must be met in the erection and installation of these barricades.

B. Develop and submit a traffic management plan to the State, Town and/or Municipal Authority(s) Having Jurisdiction (AHJ), MCRR and MassDOT for review and approval for each at-grade crossing location.

C. Coordinate with the State, Town and/or Municipal Authority(s) Having Jurisdiction (AHJ) for each crossing and secure all necessary permits, police details, traffic signage, etc. necessary for the work. The Contractor is to provide to MCRR and MassDOT confirmation and evidence of notification and required permits for each at-grade crossing.

D. Premark each at-grade crossing, contact and coordinate with Dig Safe and provide to MCRR and MassDOT confirmation and evidence of Dig Safe notification and ticket number for each at-grade crossing before any excavation work takes place.

E. Locating, protect and preserve all existing utilities, conduits, cabling, crossing signals and structures, known and unknown, within the grade crossing construction work areas.

F. Coordinate with the Railroad and utility owner(s) of any utility encountered prior to, or during, construction.

G. Coordinate with the operating Railroad(s) for the protection of any railroad crossing signal systems and proper pre-construction train traffic signaling requirements.

QUALITY CONTROL

A. Manufacturer's Qualifications:

1. Have Rubber Rail Seal components fabricated by a recognized manufacturer regularly engaged in the production of specified items.

B. Track Tolerances: Refer to Section GENERAL TRACK CONSTRUCTION for track tolerances at crossing within ballasted track. Prior to installing Rubber Rail Seal and placing HMA, the track shall be brought within acceptable tolerances.

RUBBER RAIL SEAL MATERIAL

A. Rubber Rail Seal crossing sections are to be furnished by the track foot (TF), consisting of two (2) gage side rail seal sections and two (2) field side rail seal sections and; all tools and associated hardware required for the installation of the Rubber Rail Seal Rubber Rail Seal shall be manufactured to fit the rail section to be crossed.

B. Rail Seal shall be designed to fit over the rail fastening system used for the Project as specified in section GENERAL TRACK CONSTRUCTION or as directed by the Engineer.

C. Gage side Rail Seal shall be formed to fit snugly against the web of rail section in crossing and shall provide a maximum 2 ½” wide x 1 ½” flangeway meeting ADA requirements. Gage side rail seal shall be formed with full bearing under the rail head.

D. Field side Rail Seal section shall be formed to fit snugly against web of rail and against the face of the rail head in the crossing.

E. Rubber Rail Seal shall be fabricated from virgin rubber to have an electrical resistance of 10 Mega-Ohms at 500V DC. Rubber shall not be fabricated from recycled material.

F. Furnish Rubber Rail Seal; Polycorp Epflex Railseal, HiRAIL RS Rail Seal, Rail Seal by International Track Systems, Inc. or approved equal in accordance with requirements of this Project.

RUBBER RAIL SEAL GRADE CROSSING CONSTRUCTION

A. Break existing rail joints in the track at four points on either side of the crossing for each track in preparation for crossing demolition. If it is determined by MassDOT/MCRR that the nearest joint is beyond a reasonable distance from the crossing, the Contractor is to cut and drill the rail for new joint locations. The joints to be broken, and/or any new joint locations, will be determined in the field by MassDOT/MCRR personnel.

1. If grade crossing is located in Continuously Welded Rail (CWR) territory, or the Engineer determines the crossing rails to be susceptible to thermal influence, the following shall apply: Preventative Rail Anchoring (PRA) shall be installed for a minimum distance of two hundred track feet (200 TF) from the proposed rail cut-in locations in both directions prior to removing any existing track structure and cutting of the rails. PRA consists of fully box anchoring each tie for two hundred track feet (200 TF) in accordance with MassDOT MW-1, section 125.1, C., (1), c).

B. The Contractor is to saw cut the roadway pavement as shown on the Contract Plans or as directed by MassDOT/MCRR (Typically fifteen feet (15’) from track centerline in both directions).

C. Remove all existing pavement, wooden crossing material, rubber crossing material, steel material, rails, OTM, crossties, ballast and subgrade material from within the grade crossing excavation limits as shown on the Contract Plans or as designated by MassDOT/MCRR.

D. Excavate a trackbed “Box” to the dimensions indicated in the Scope of Work or as directed by MassDOT/MCRR. (Typically twelve feet wide and twenty-eight inched deep from TOR (12’ x 28” x Length))

E. Load-out, remove and dispose of all excavated wood materials. Defective wood material is to be taken to a MassDOT approved disposal site specifically licensed for the processing of creosote treated railroad crossties and be disposed of in accordance with EPA requirements. Crossties deemed reusable shall be neatly stacked, bundled and for deliver (typically by Contractor) to a MassDOT/MCRR Storage Facility within a seventy-five (75) mile radius of the crossing as directed by MassDOT/MCRR.

F. Load-out, remove and dispose of all excavated asphalt, concrete and rubber material. Excavated asphalt, concrete and rubber material is to be disposed of in accordance with State, local and Mass DEP requirements.

G. Salvaged rail and OTM shall be delivered to a MCRR or MassDOT Storage Facility located within a 75 mile radius of the crossing. The salvaged rail and OTM shall be stockpiled together at the storage facility as directed by MassDOT/MCRR.

H. Construct ballasted track at grade crossings to the alignment and profile indicated on, and in accordance with, the Contract Drawings.

I. Joints shall fall a minimum of fifteen feet (15’) outside the limits of the crossings. Field weld any rail joints that would fall within the limits of the rail seal installation in accordance with section WELDING OF RAIL.

J. Ballast height must be retained at one inch (1”) below rail base before and after crossing has been placed in service.

K. Clean all stone and debris from crosstie, plates and rail surfaces which will contact the Rail Seal prior to installation.

L. Install clamps to hold the rail seal tight against the rail as required in each tie crib within the limits of the crossing per manufacturer’s specifications. Clamps must be attached prior to the placement of the HMA pavement.

M. Place HMA pavement to the limits shown on the Contract Plans; as indicated in section HOT MIX ASPHALT (HMA) CROSSING MATERIAL and as specified in this section.

N. HMA shall be placed in lifts of two inches (2”) minimum and four inches (4”) maximum. Care shall be taken during compaction of asphalt to prevent damage to hold down clamps or Rubber Rail Seal. HMA shall be rolled parallel to the rail until the final lift and compaction. Final lift of HMA shall be level with the top of rail between gage lines and for a minimum of thirty inches (30”) from the field side of the rail.

O. HMA shall extend a minimum of two feet (2’) beyond the end of the rail seal and then taper down from top of rail to top of tie at a 3:1 slope. A two inch by two inch (2” x 2”) flangeway shall be maintained in the HMA through the gage side of the rails.

P. Slope edge of paving to return to original edge of paving alignment.

MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item of Work to which they pertain.

END OF SECTION

HOT MIX ASPHALT (HMA) CROSSING MATERIAL

GENERAL

A. Work Included: This Section specifies the installation of hot mix asphalt pavement grade crossing material on prepared subgrade or aggregate subbase or base course, or existing pavement, to the lines, grades, compacted thickness, and cross sections indicated.

B. Contractor shall furnish HMA pavements as reference in the Special Conditions

QUALITY ASSURANCE

A. Job Mix Formulae

1. The composition limits specified in Table 02513-C at the end of this Section are master ranges of tolerances of materials in general. In order to obtain standard texture, density, and stability, furnish to Engineer for approval a specific job mix formula for the particular uniform combination of materials and sources of supply to be used on this project. Establish the job mix formula in accordance with the requirements of Bituminous Material Standards defined in the MassDOT Standard Specifications for Highways and Bridges, Division III, Section M3 – Bituminous Material.

2. Should a change of sources of materials be made, furnish a new job mix formula for approval before using the new material.

3. Two or more job mix formulae may be approved for a particular plant; however, only material conforming to one job mix formula will be permitted to be used on any given day. If Contractor elects to furnish hot mix asphalt from more than one plant, the job mix formulae shall be adhered to by all plants.

4. When unsatisfactory results or other conditions make it necessary, Engineer may establish new job mix formulae.

B. Methods of Sampling and Testing

1. Performance Graded Asphalt Binder:
   a. Viscosity: ASTM D4402.
   b. Dynamic Shear: AASHTO TP5.
   c. Flash Point: AASHTO T48.
   d. Rolling Thin Film Over Test: AASHTO T240.
   e. Mass Change %: AASHTO T240.
   f. PAV Aging: AASHTO PP1.
   g. Specific Gravity: ASTM D 3142.

   h. Creep Stiffness and M-Value: AASHTO TP1.

2. Cutback Asphalt:
   a. Viscosity: ASTM D 2170.
   b. Flash Point: ASTM D 3143.
   c. Distillation: ASTM D 402.
   d. Water in Asphalt: AASHTO T55.
   e. Specific Gravity: AASHTO T228.

3. Emulsified Asphalt: ASTM D 977.

4. Joint and Crack Sealants, Type I:
   a. General: ASTM D 6690
   b. Testing: ASTM D 36 and ASTM D 5329.

5. Mineral Aggregates and Filler:
   a. Sieve Analysis, Aggregates: ASTM C 136.
   b. Sieve Analysis, Mineral Filler: ASTM D 242.
   c. Unit Weight of Aggregate: ASTM C 29.
   d. Material Passing No. 200 Sieve: ASTM C 117.
   e. Abrasion of Coarse Aggregate: ASTM C 131.
   f. Soundness of Aggregates: ASTM C 88.
   g. Specific Gravity, Coarse Aggregate: ASTM C 127.
   h. Specific Gravity, Fine Aggregate: ASTM C 128.
   i. Specific Gravity, Mineral Filler: AASHTO T100 to T133

6. Hot Mix Asphalt Mixtures:
   a. Density: AASHTO T166.
   b. Compaction: ASTM D 2950.

C. Composition and Compaction Acceptance Tests

1. Where plant inspection is maintained, hot mix asphalt will be acceptable for use if the specified tests from samples obtained at the production plant indicate conformance to the approved job mix formula.

2. For determination of pavement density, perform in-place density testing by the Nuclear Density Method, ASTM D 2950. The number of tests shall be determined by the MassDOT QA lab.

3. MCRR (Railroad) and MassDOT (Owner) may also require bituminous cores to determine in-place density.

MATERIALS

A. Performance Graded Asphalt Binder:

1. AASHTO M320, grade as indicated, except that the requirements listed under Table 02513-A shall apply.

B. Cutback Asphalts

1. Medium-Curing: AASHTO M82, grade as indicated.

C. Bituminous Emulsions

1. Asphaltic Emulsions: AASHTO M140, grade as indicated. Use grade RS-1 for prime coat or tack coat.

2. Cationic Emulsified Asphalt: AASHTO M208, grade as indicated.

3. Clay-Type Asphalt Emulsion: A mineral colloid type of asphalt emulsion containing no chemical emulsifiers and meeting the following requirements:

   a. Percent water, per AASHTO T59: 40 to 55
   b. Percent residue by evaporation, per AASHTO T59: 45 to 60
   c. Percent ash in residue, per ASTM D1010: 5 to 15
   d. Curing time, per Massachusetts DPW standard test procedures: firm set in 48 hours maximum
   e. Resistance to water, per Massachusetts DPW standard test procedures: no re-emulsification.

4. Protective Seal Coat Emulsion: a homogeneous emulsion consisting of coal tar pitch dispersed in water by means of a mineral colloid, containing no asphaltic materials or chemical emulsifiers; capable of overcoming any separation or coagulation of its components by moderate stirring; meeting the following requirements:

   a. Percent Water, per AASHTO T59: 50 maximum
   b. Percent non-volatile matter, per ASTM D1010: 48 minimum
   c. Percent ash in non-volatile matter, per ASTM D1010: 20 to 45
   d. Percent solubility on non-volatile matter in carbon disulfide: 40 minimum
   e. Resistance to water, per ASTM D466: no blistering, loss of adhesion, or re-emulsification
   f. Resistance to petroleum solvents, per ASTM D466 with solvents substituted for water: no penetration or loss of adhesion.

D. Asphalt Anti-Stripping Additive

1. General: An additive to asphalt to assist in the coating of wet aggregate and to increase the resistance of the bituminous coating to stripping in the presence of water; shall be chemically inert to asphalt (heat stable) and when blended with asphalt shall withstand storage at a temperature of 400˚F for extended periods without loss of effectiveness.

2. Composition: An organic chemical compound free from inorganic mineral salts or inorganic mineral soaps, containing no ingredient harmful to the bituminous material or to the operator, and not appreciably altering the specified characteristics of the bituminous material; chemically inert to asphalt.

3. Heat Stability: The compound shall retain its effectiveness after heating in asphalt according to the prescribed method for 24 hours at 350˚F.

4. Resistance to Stripping. Treated Bitumen shall coat wet aggregate and shall retain at least 90 percent of the coating after 24 hours of static immersion. There shall be no loss of the retained coating after the immersion has been extended to one week.

E. Coarse Aggregate

1. General: Clean, crushed rock consisting of the angular fragments obtained by breaking and crushing shattered natural rock, free from a detrimental quantity of thin or elongated pieces, and free from dirt or other objectionable materials; having a percentage of wear of not more than 30; surface dry and having a moisture content of not more than 0.5 percent after drying. The use of crushed gravel stone will not be permitted.

2. Gradation: Blended from the stone sizes listed in Table 02513-B. Each stone size shall meet its respective gradation as tabulated in Table 02513-B. Sizes other than primary stone sizes may be used providing they are separately introduced on the cold feed belt and can be shown to be an improvement to the mix. Such usage shall require the prior written approval of Engineer.

F. Fine Aggregate

1. General: Natural or stone sand or a blend thereof; or a blend of natural sand and stone screenings, or a blend of stone, sand and stone screenings;
   a. Natural Sand: Clean, inert, hard durable grains of quartz or other hard durable rock, free of loam, clay, surface coatings or other deleterious substances.
   b. Stone Sand: Process from the stone screenings, of either a primary or secondary crusher to produce a product that when used alone or blended in any combination with natural sand shall meet the specified gradation requirements. Wash plant or other equipment used for processing stone sand shall be as accepted by Engineer.

G. Mineral Filler

1. Portland cement, limestone dust, hydrated lime, stone float, or stone dust, 100 percent passing a No. 50 sieve and not less than 65 percent passing a No. 200 sieve. Stone dust shall be produced from crushed ledge stone and shall be the product of a secondary crusher so processed as to deliver a product of uniform grading.

2. Reclaimed Asphalt Pavement (RAP) shall consist of the material obtained from the highways or streets by crushing, milling, or planing existing hot mix asphalt pavements. This material shall be transported to the hot mix asphalt production facility yard and processed through an appropriate crusher so that the resulting material will contain no particles larger than the maximum aggregate size of the hot mix asphalt mixture in which it will be used. The

material shall be stockpiled on a free draining base and kept separate from virgin aggregates. The material contained in the RAP stockpiles shall have a reasonably uniform gradation from fine to coarse and shall be protected from accumulation of excessive moisture and shall not be contaminated by foreign materials. The use of RAP will be permitted provided that the end product is in conformance with the approved job-mix formula. The proportion of RAP to virgin aggregate for base course mixtures and intermediate course mixtures shall be limited to a maximum of 40% for drum mix plants and 20% for modified batch plants. The maximum amount of RAP for surface course mixtures shall be 10%.

3. Joint and Crack Sealants shall consist of a hot applied elastomeric crack/joint sealant for asphaltic concrete pavements. Sealant shall be melted via a kettle or melter constructed as a double boiler. The space between the inner and outer shells filled with high flash point heat transfer oil or other indirect heating means. The kettle to be used must have constant agitation any time material is over three hundred (300) degrees F. The kettle must have temperature-monitoring capabilities. Roofing kettles or other direct fired melters are not acceptable for these materials.

HOT MIX ASPHALT (HMA) MIXES

A. Provide Hot Mix Asphalt mixtures composed of mineral aggregate, mineral filler if required bituminous material, and anti-stripping additive if required, proportioned as specified herein to conform to the composition by weight tabulated in Table 02513-C and in the approved job mix formulae.

B. Use sufficient mineral filler to correct any deficiencies in grading of fine aggregate.

C. Anti-stripping additive, if required, shall be incorporated and thoroughly dispersed in the bituminous material in an amount equal to the percent by weight established by Contractor's Materials Testing Laboratory and approved by Railroad or Owner. This percent will be based on the efficiency of the additive as determined by laboratory tests. No modification of the established additive concentration will be permitted because of the use of hydrophobic aggregate. Railroad and Owner reserve the right to establish as minimum the percentage of additive required. Blend additive in the refinery with the asphalt in the presence of the Inspector.

D. The percentages stated herein and in Table 02513-C are stated as proportional percentages of integral total aggregate for the mix.

E. Furnish Intermediate Course, with anti-stripping additive, for use as protective (bottom) course of pavements where indicated.

F. Furnish Patching Mix with one percent hydrated lime.

PLANT REQUIREMENTS

A. General: The plant used in the production of hot mix asphalt shall comply with AASHTO M156, subject to the following additional requirements:

1. Plant Scales

   a. Scales for measuring materials into the mixtures shall be springless dial type and shall be of standard make and design. Scale graduations and markings shall be plainly visible and dials shall be so located as to be easily readable from the operator's normal work station by direct sight or through repeating dials. Parallax effects shall be reduced to the practical minimum with clearance between indicator index and scale graduations not exceeding 0.06 inch. Dials shall be equipped with a full complement of adjustable index pointers for marking the required weight of each material to be weighed into the batch.

   b. Digital scales will be either electric/mechanical (load cell and lever system) or fully electronic (all load cell). Digital indicators shall be of standard make and design. Scale graduations and capacity shall be plainly visible on the faceplate of the indicator, if panel mounted. If the unit is of desktop or wall-mount variety, a data sticker shall be located on the side of the unit. Indicators must be located as to be easily readable from the operator’s normal workstation by sight.

   c. Bitumen scales shall be accurate to 0.05 percent, have minimum graduations not greater than 0.025 percent, and shall be readable and sensitive to 0.0125 percent or less. Scales for any weigh box or hopper shall be accurate to 0.5 percent, have minimum graduations not greater than 0.5 percent and shall be readable and sensitive to 0.25 percent or less. The preceding percentages for both bitumen and aggregate scales are based on the maximum total batch weight of the mixtures.

2. Testing of Scales

   a. All plant scales, including truck scales, shall be tested at the expense of Contractor by a competent scale technician as follows:

      1) Annually prior to use in Railroad and Owner work.
      2) At intervals of not more than 90 calendar days.
      3) At any time ordered by Engineer.

   b. A cradle or platform approved by Engineer for each scale and at least ten standard fifty-pound test weights shall be provided for testing scales whenever directed by Engineer. The use of a set of test weights for two or more plants will be permitted only when they can be made readily available with no more than an hour's notice.

3. Automatic Batching

   a. Automatic proportioning: Batch type mixing plants shall be equipped with approved automatic proportioning devices. Such devices shall include equipment for accurately proportioning batches containing the various components of the mixture by weight in the proper sequence and for controlling the sequence and timing of mixing operations. Interlocks shall be provided which will hold or delay the automatic batch cycling whenever the batched quantity of any component is not within the specified weight tolerance, when any aggregate bin becomes empty or when there is a malfunction in any portion of the control system. The weight setting and time controls shall be so equipped that they may be locked when directed by Engineer.

b. Automatic Recordation: Recordation equipment shall be provided. Each recorder shall include an automatic printer system. The printer shall be so positioned that the scale dial and the printer can be readily observed at one location by the plant inspector. Use of repeating dials or an additional printer to achieve this condition will be permitted. The printer shall print, in digital form, on a delivery ticket the following data:

1) Date mixed.
2) Time of batching.
3) Tare weight of aggregate weigh box.
4) Tare weight of bitumen weigh bucket.
5) Accumulative weights as batched for each bin. (Total of last bin will be aggregate total).
6) Weight of bitumen.
7) Total weight of mix in truck (Pay weight). This printed ticket shall be used in lieu of truck scale weights.

c. Equipment Failure. If at any time the automatic proportioning of recording system becomes inoperative, the plant will be allowed to batch materials manually for a period not in excess of two working days. Manual batching for longer periods will require written permission of Engineer.

d. Batching Controls

1) The batching controls shall meet the following delivery tolerances with respect to the various components weighed in each batch:
   a) Tare Weight of Aggregate Weigh Box: + 0.5 percent of total batch weight.
   b) Tare Weight of Bitumen Weigh Bucket: + 0.1 percent of total batch weight.
   c) Individual Aggregate Components: + 1.0 percent of total batch weight.
   d) Combined Aggregate Components: + 1.5 percent of total batch weight.
   e) Mineral Filler: + 0.5 percent of total batch weight.
   f) Asphalt: + 0.1 percent of total batch weight.
2) The total weight of the batch shall not vary more than plus or minus 2 percent from the theoretical design weight.
3) If directed by Engineer, provisions shall be made for locking controls against tampering.

4. Plant Laboratory

a. A building shall be furnished at the site of the producing plant suitable for the housing and use of equipment necessary to carry on the various tests required and for recording and processing test results. This building shall be for the exclusive use of Engineer or his representatives for testing and recording purposes.

b. The building shall have a minimum floor area of 100 square feet; the least dimension to be 6 feet. Windows and doors shall be adequately screened; satisfactory lighting, heating and water shall be supplied. A table, chairs, desk and work bench shall be provided. Provision shall be made for the safe performance of extraction test determinations by providing an adequate exhaust fan and suitable means of disposing of used solvent and other waste.

c. If Engineer permits, the plant laboratory may be part of another building in which case it shall be entirely partitioned off from the remainder of such building.

d. Testing equipment shall be furnished as follows and installed in the building for use in testing the materials and mixtures supplied by the Plant for the work:

1) One Approved Rotary Extractor.
2) One Coarse Aggregate Sieve Shaker, power driven with a minimum clear siege area of 324 square inches. The shaker shall be attached to a firm anchorage.
3) One each of the following square opening screens for coarse aggregate shaker: 2 inch, 1-1/2 inch, 1 inch, 3/4 inch, 1/2 inch, 1/8 inch, No. 4 and No. 8.
4) One Fine Aggregate Sieve Shaker, power driven and independent of the coarse aggregate shaker, for eight inch minimum diameter sieves.
5) One each of the following standard eight inch minimum diameter square opening sieves: 3/4 inch, 1/2 inch, 3/8 inch, No. 4, No. 8, No. 16, No. 30, No. 50, No. 100, and No. 200, with pan and cover.
6) One Sample Splitter with a minimum capacity of one cubic foot. It shall be the clam shell type and the chute width shall be adjustable from a minimum of 1/2 inch up to 2 inches.
7) One Solution Balance, 20 kilogram capacity, weighing directly to 1 gram, with two weighing beams and a taring beam; tare capacity to be 2 kilograms; weighing beams to read 1000 grams by 100 gram divisions and 100 grams by 1 gram division. Additional matching weights (one 1 kg., two 2 kg., one 5 kg., and one 10 kg.) shall be provided to fulfill the capacity of 20 kilograms. The platform to be 11 inches in diameter.
8) One Approved Scale with a minimum capacity of 2000 grams and with a sensitivity of 0.50 grams
9) Two Approved Dial Type Thermometers, range 50˚F. to 500˚F.
10) One Approved Hot Plate

e. Approval of a plant will be contingent upon approval of the aforementioned requirements for Plant Laboratory, including the building and appurtenances, furnishings, facilities including heat, light, power and water, the testing equipment, and any other incidentals.

5. Sampling facilities. Adequate and convenient sampling facilities shall be provided to allow the Inspector to obtain representative samples from the full width and depth of the discharge area of each aggregate bin. The sampling tray shall be structurally supported during the sampling operation. Access to the sampling facilities shall be provided requiring no more difficulty than that to climb a ladder leading to a secure platform with railings.

6. Inspection. Engineer or his authorized representative shall have access at any time to all parts of the plant for:

a. Inspections of the conditions and operations of the plant.

b. Confirmation of the adequacy of the equipment in use.

c. Verification of the character and proportions of the mixture.

d. Determination of temperatures being maintained in the preparation of the mixtures.

e. Inspection of incidental related procedures.

PREPARATION OF MIXTURES

A. Preparation of Asphalt Cement:Place bituminous materials in the mixer at a temperature between 275˚F and 375˚F, as directed.

B. Preparation of Mineral Aggregate: Thoroughly dry and heat aggregates before placing them in the mixer. Control the temperature of the aggregates so that the temperature of the complete mixture shall be within the range specified in paragraph C. below.

C. Preparation of Hot Mix Asphalt Mixtures: Combine the heated and dried aggregates and mineral filler and convey them into the mixer in the proportionate amounts of each size required to meet the job mix formula. After these materials have been mixed for the specified dry-mixing time, add the asphalt cement and mix for the specified wet-mixing time. Measure asphalt cement by weight or by an approved metering device. The temperature of the mixture when discharged shall be between 275˚F and 325˚F.

TRANSPORTATION AND DELIVERY OF MIXTURES

A. Vehicles for transportation of mixtures from the plant to the jobsite shall be clean of all foreign materials, tight, and evenly and lightly coated with a suitable thin oil or approved soap solution. No excess of lubricant shall be allowed to accumulate in low spots in the body. When necessary, vehicles shall be insulated so that the mixture is delivered for placement at the proper temperature.

B. Arrange dispatching of trucks from the plant so that all material which is delivered to the jobsite during any day shall be placed and shall have received final compaction before nightfall of the same day, unless satisfactory artificial light is provided.

C. Do not transport mixtures such a distance that segregation of the ingredients takes place or that any crust is formed on the top, bottom, or sides of the mixture which will not crumble or flatten out when the mixture is dumped or which might otherwise be deleterious to the mixture in place on the work.

D. During transportation of the mixture from the plant to the spreader at the jobsite, keep the mixture fully covered at all times with canvas or other suitable material of sufficient size and thickness to furnish complete protection.

E. Deliver the mixture to the jobsite at a temperature governed by the air temperature in the shade and away from artificial heat, as follows with a tolerance of plus or minus 20˚F:

1. Normal Layered Construction:

Air Temperature	Delivered Mix Temperature
35˚F.	300˚F.
40˚F.	290˚F.
65˚F.	280˚F.
90˚F. and Over	275˚F.

2. Deep Lift Paving (3 inches and over), Base and Binder Courses only:

Air Temperature	Delivered Mix Temperature
35˚F.	280˚F.
40˚F.	270˚F.
65˚F. and over	260˚F.

PRIME COAT (OR TACK COAT)

A. Where an existing hardened surface is used as a base for new pavement, or elsewhere where the surface to receive hot mix asphalt pavement is, in Engineer's judgment, unsatisfactory to receive the pavement, give the surface a prime coat of bituminous material of the kind and grade indicated or directed. Where unsatisfactory conditions, requiring application of prime coat, are due to the fault of Contractor, provide the prime coat at no additional expense to Railroad and Owner.

B. Clean the existing surface of all foreign matter and loose material before applying prime coat. Apply the prime coat by mechanical means at the rate indicated or directed.

SPREADING AND FINISHING

A. General

1. Place hot mix asphalt for grade crossing material in courses as indicated on the Contract Plans, Scope of Work, and Special Conditions.

2. A proper flangeway of 2”x2” shall be maintained adjacent to the gage side of the rail when placing asphalt between the rails of the track for which the crossing material is being installed.

3. When an existing surface or new base, upon which the bottom course is to be laid, contains unsatisfactory irregularities, in Engineer's judgment, eliminate such irregularities by placing and compaction of mixture, so as to furnish a surface with true contour and grade before placing any specified bottom course.

4. Paint thoroughly the contact surfaces of curbing, manholes, catch basins, and other appurtenant structures in pavement, with a thin coating of bitumen immediately prior to placing any mixture against them.

5. Give special attention to proper testing of the surface of each course with a straightedge. Finished surfaces shall be even and uniform throughout.

6. Remove and replace with new mixture any mixture which becomes loose or broken, mixed with dirt, or defective in any way. Finish and compact the repaired area to conform to the surrounding area. Remove and replace areas of one square foot or more showing an excess of bitumen.

7. No mixture shall be placed unless the breakdown and intermediate rolling can be completed by the time the material has cooled at 175˚F, provided that the density of the pavement attains at least 95 percent of the laboratory compacted density.

B. Spreading and Finishing Equipment

1. The equipment for spreading and finishing shall be mechanical, self-powered pavers, capable of spreading and finishing the mixture to line, grade, width, and crown by means of fully automated controls for both longitudinal and transverse slope.

2. The pavers shall be equipped with hoppers and distributing screws of the reversing type to place the mixture evenly in front of adjustable screeds. They shall be equipped with a quick and efficient steering device and shall have reverse as well as forward traveling speeds.

3. The pavers shall employ mechanical devices such as equalizing runners, straight edge runners, evener arms or other compensating devices to adjust the grade and confine the edges of the mixture to true lines. They shall be capable of spreading the mixture without segregation in layers to the depths and widths required. They shall be equipped with blending or joint leveling devices for smoothing and adjusting all longitudinal joints between adjacent strips or courses of the same thickness.

4. The screed shall be adjustable for profile and shall have an indicating level attached.

5. An approved device will be required for heating the screed to the temperature required for the laying of the mixtures without pulling or marring.

6. The term "screed" includes any "strike-off" device operated by cutting, crowding, or other practicable action, which is effective on the mixtures at permissible workable temperatures without tearing, shoving, or gouging and which produces a finished surface of the evenness and texture required.

7. The pavers employed on projects requiring in excess of 15,000 tons shall operate by the use of a sensing grid for operation to a stringline and matching shoe for joints.

8. The paver shall be provided with a "ski" which may be employed for paving on the previously laid hot mix asphalt base, or binder as directed or permitted by Engineer.

9. The paver employed on deep lift construction shall be capable of satisfactorily feeding the mix without intermittent stopping during the discharge of the mix from the trucks into the paving machine.

10. If during construction, it is found that the spreading and finishing equipment in use leaves tracks or indented areas, or produces other permanent blemishes in the pavement which are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued and other satisfactory spreading and finishing equipment shall be provided.

11. Complete all compaction rolling before the hot mix asphalt temperature drops below 185˚Fahrenheit.

C. Machine Spreading

1. Deposit mixtures in the approved mechanical spreader, spread immediately, and strike off in a uniform layer to the full width required and to such depth that each course, when compacted, shall have the required thickness and shall conform to the indicated grade and cross section contour.

2. Deposit mixture in the center of the hoppers, exercising care to avoid overloading and spilling. Operate the pavers, while the mixture is being spread, at a speed which will produce a uniform surface texture.

3. Immediately after each course is screeded and before roller compaction is started, check the surface, adjust any irregularities, remove accumulation from the screed by rake or lute, and remove and replace any unsatisfactory spots in the course. Correct irregularities in line and grade along outside edges by addition or removal of material before the edge is rolled. Indiscriminate casting of mix on the new screeded surface, where irregularities are not evident, will not be permitted.

4. All edges shall be true and uniform.

D. Hand Spreading

1. Spreading by hand methods will be permitted only for particular locations in the work which because of irregularity, inaccessibility or other unavoidable obstacles do not allow mechanical spreading and finishing.

2. When hand spreading is permitted, place the mixture by dumping on approved steel dump sheets outside the area upon which it is to be spread; or by other approved methods. Immediately thereafter, distribute the mixture into place by means of hot shovels, and spread it with hot rakes or lutes in a loose layer of uniform density and correct depth. Tines of the rakes shall be not less than 1/2 inch longer than the loose depth of mixture and spaces between tines shall be not less than 1 inch.

3. Do not dump loads faster than they can be properly handled by the shovelers, and do not distribute the dumped load faster than it can be properly handled by the rakers. Rake carefully and skillfully to avoid segregation and so that, after the first passage of the roller over the raked mixture, no back patching will be necessary.

COMPACTION

A. Compaction Equipment

1. After the paving mixture has been properly spread, initial compaction shall be obtained by the use of power rollers of approved design and weight per inch width of roller. The rollers shall be steel-wheeled supplemented with pneumatic-tired rollers where required, or where permitted, vibratory rollers.

2. Steel wheel rollers for initial and intermediate rolling shall have a weight of not less than 240 pounds per inch width of tread; for top course, minimum weight shall be 285 pounds per inch width of tread.

3. Pneumatic-tired rollers, when conditions warrant, shall be provided with devices capable of varying tire pressures. When the mixture being spread by each paver requires more than the minimum number of steel wheel rollers, at least one of the additional rollers for each paver shall be a pneumatic-tired roller, except where the use of a vibratory roller is permitted. When using a pneumatic-tired roller, care shall be taken that initial rolling by the steel wheel roller be restricted to one pass where upon the pneumatic-tired roller shall immediately follow the initial steel wheel rolling.

4. Vibratory steel drum rollers shall not be used on top course mix or structures. The machine shall have a device registering the number of vibrations per minute and a tachometer shall be provided to Engineer in order to check the operation of the roller.

5. The V.P.M. on base and binder course material shall be a minimum of 1400 V.P.M. and a maximum of 1500 V.P.M., or in accordance with the recommendations of the manufacturer, when approved by Engineer.

6. The vibratory roller shall be operated with the vibrating drum in the direction of the paver and the vibrating action of the roller shall be completely shut off during change of direction and care exercised to start this action only when the roller is in motion. In order to prevent creeping and aggregate crushing during rolling of layered pavement, care shall be taken not to exceed one pass in the direction of the paver with vibrator in action and one return in a static condition and for deep lift pavements these passes shall not exceed two operations in each direction, except that the number of vibratory passes in either direction may be varied in order to obtain the required density.

7. A smoothing roller of either the pneumatic-tired or steel wheeled type shall be used immediately behind the last pass of the vibrating roller. The use of a vibratory roller may be suspended by Engineer if, in his opinion, unsatisfactory results are being obtained and no further mix shall be spread until a sufficient number of approved rollers are on the project to satisfy the compaction requirements.

8. A plate shall be attached to each roller which shall show the ballasted and unballasted weight per inch width of tread.

9. The number of rollers and passes required shall be governed by the compaction results; however, at least one steel roller shall be provided for each paver employed on the paving operation. This is independent of the requirements of the pneumatic-tired roller.

B. Compaction Procedures

1. Roll the mixture longitudinally, diagonally, and transversely as may be necessary to produce the required contour for surface. Start longitudinal rolling at the side and proceed toward the center of the pavement, except on superelevated curves start at the low side and progress to the high side, overlapping on successive trips by at least 12 inches.

2. Continue the rolling so that all roller marks, ridges, porous spots, and impressions are eliminated and the surface has the required contour and grade. Maintain the motion of the rollers at all times slow enough to avoid any displacement of the hot mixture. Correct any displacement or marring of the surface resulting from reversing the direction of the roller or from any other cause.

3. To prevent adhesion with the mixture, keep the wheels of steel rollers lightly moistened with water. Excess water or oil for this purpose will not be permitted.

4. To prevent "roll-off" of the pavement edges and longitudinal joints on deep lift paving, leave the outer eight inches of the deep lift mixture unrolled until the temperature of the mix ranges between 150˚F and 180˚F., whereupon compact it with a steel roller.

5. Along curbs, structures, and all places not accessible with a roller, compact the surface thoroughly with mechanical tamping devices, smooth and true to established line, grade, and contour.

6. Density of completed pavement shall not be less than 95 percent of the density obtained from laboratory compaction of a mixture composed of the same materials in like proportions.

JOINTS

A. Place mixture as nearly continuously as possible. Pass the roller over the unprotected end of newly placed mixture only when the placing of the course is to be discontinued for such length of time as will permit the mixture to attain initial stability. In all such cases, including the formation of joints as herein specified, provide for proper bond with the new surface for the full specified depths of the courses.

B. Maximum length of longitudinal joint shall be such that the temperature of the mixture at the joint shall not be less than 150˚F when the abutting mixture is placed.

C. Make longitudinal and transverse joints in a careful manner, well bonded and sealed, true to line and grade. Where directed, cut back longitudinal and transverse joints to expose the full depth of the course and, when laying of the course is resumed, paint the exposed edge of the joint with a thin coat of bitumen. Carefully rake the new mixture against the joint, then thoroughly tamp and roll.

D. In making joints along any adjoining edge such as curb, gutter, or an adjoining pavement, and after the mixture is spread by the paver, place by hand just enough of the hot material to fill any space left open. Set up these joints with the back of a rake at the proper height and level to receive the proper compaction.

E. Stagger longitudinal joints in successive courses so that there is a minimum of one foot overlap between longitudinal joints in adjacent courses.

F. Overlap the rolling of successive widths of courses so as to leave smooth, uniform joints and cross sections.

JOINT AND CRACK SEALANTS

A. Inspect existing pavement for conditions and defects that will adversely affect quality of work and which cannot be put into acceptable condition through normal preparatory work as specified. Starting installation constitutes Contractors acceptance of surface as suitable for installation.

B. Remove vegetation and all incompressible materials from cracks and joints by means of hot compressed air lance. (Other methods such as routing w/compressed air cleaning may be substituted at Engineer’s specification. Under ANY circumstances compressed air used for cleaning MUST be oil free.

C. Prepare sealant in specified equipment. Heat sealant according to manufacturer's Product Data Sheet.

D. Install heated sealant directly into cracks and joints not to exceed a one (1) inch wide band. Control thickness to one-eighth (1/8) inch above pavement surface. Finished sealed cracks and joints will be uniformly level and all "sinkers" will be refilled to achieve flush to one eighth (1/8) inch concave surface appearance.

E. Care must be taken to keep the public from work area while sealant is being installed and traffic should not be allowed to cross sealant filled cracks and joints for a period of ten (10) minutes or until sealant has cooled sufficiently to prevent tracking. Failure to follow manufacturer's printed recommendations could result in a severe burn hazard.

FIELD QUALITY CONTROL

A. Test the plane of the finished surfaces of base, binder, and surface courses with a 16-foot straightedge, except use a 10-foot straightedge on vertical courses and on the top course of resurfaced streets which contain manhole covers, valve boxes, and the like.

B. Carefully apply the straightedge immediately after the first compaction by rolling, and from then on as may be necessary until and after the final compaction of the material in place. Hold the straightedge in successive positions parallel to the road centerline and in contact with the road surface; check the entire area from one side of the pavement to the other.

C. Correct irregularities which vary 3/8 inch from a true finished surface in base and binder courses, and 1/4 inch in top courses.

D. Irregularities which may develop before the completion of rolling and while the material is still workable, may be remedied by loosening the surface mixture and removing or adding material as necessary. Should any unsatisfactory irregularities or defects remain after final compaction, correct the defective work by removing and replacing with new material to form a true and even surface.

OPENING TO TRAFFIC

A. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained, and the material has cooled sufficiently to prevent distortion or loss of fines, and the pavement has achieved a maximum temperature of 140˚F.

B. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of Engineer.

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TABLE 02513 – A

SPECIFICATION REQUIREMENTS FOR PERFORMANCE GRADED ASPHALT BINDERS

TESTS AT PG TEMPERATURE deg. C.	PG 64-22	PG 64-28	PG 52-34
Viscosity, Brookfield 135 degrees C Pa-sec.	3 Max.	3 Max	3 Max
Dynamic Shear, 10 Rad./sec. Kpa	1.00 Min.	1.00 Min.	1.00 Min.
RTFO, % Change	1.0 Max.	1.0 Max.	1.0 Max.
RTFO, Residue Dynamic Shear, KPa	2.20 Min.	2.20 Min.	2.20 Min.
PAV Residue Dynamic Shear, KPa	5,000 Max.	5,000 Max.	5,000 Max.
Creep Stiffness (s), MPa	300 Max.	300 Max.	300 Max.

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TABLE 02513-B

GRADATION REQUIREMENTS FOR COARSE AGGREGATE

(PERCENT BY WEIGHT)

Nominal Size of Stone Sieve Size	2 in.	1-1 /2 in.	1-1 /4 in.	3 /4 in.	1 /2 in.	3 /8 in.
2-1/2"		100				
2"	90-100	100				
1-1/2"		95-100	100			
1-1/4"	25-50		85-100			
1"		35-70		100		
3/4"	0-15	0-25	10-40	90-100		
5/8"					100	
1/2"	0-5		0-8	10-50	85-100	100
3/8"				0-20	15-45	85-100
No. 4				0-5	0-15	20-50
No. 8					0-5	0-15
No.16						0-5

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TABLE 02513-C

MASTER RANGES FOR JOB MIX FORMULAE

(PERCENT BY WEIGHT)

Standard Sieves	Base Course	Binder Course	Intermediate Course	Top Course	Dense Mix	Surface Treatment	Patching Mix
2"	100						
1-1/2"	90-100						
1"	65-90	100	100				
3/4"	55-80	80-100	76-98				
1/2"	40-65	55-80	66-86	100	100		100
3/8"			57-77	80-100	80-100	100	90-100
No. 4	20-45	28-50	40-60	50-76	55-80	80-100	50-65
No. 8	15-33	20-38	26-46	37-54	48-63	64-85	24-36
No. 16			17-37	26-40	36-49	46-68	14-28
No. 30	8-17	8-22	11-27	17-31	24-38	26-50	8-25
No. 50	4-12	5-15	7-19	10-23	14-27	13-31	5-21
No. 100			6-16	5-16	6-18	7-17	3-15
No. 200	0-4	0-5	3-6	2-7	4-8	3-8	2-8
Bitumen	4-5	4.5-5.5	4.5-6.0	5.5-7.0	7-8	7-8	4-6

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TABLE 02513-D

ACTION LIMITS FOR AGGREGATE GRADATIONS AND BINDER CONTENT

SIEVE DESIGNATION/BINDER CONTENT	ACTION LIMIT
Passing No.4 Sieve and Larger Sieve Sizes	JMF Target +/- 6%
Passing No. 8 Sieves	JMF Target +/- 5%
Passing No. 16 to No. 50 Sieves (Inclusive)	JMF Target +/- 3%
Passing No. 100 Sieve	JMF Target +_/- 2%
Passing No. 200 Sieve	JMF Target +/- 1%
Binder	JMF Target +/-0.3%

Deviations from the final approved mix design for bitumen content and gradation of aggregates shall be within the action limits for individual measurements as specified in Table 02513-D. The limits still will apply if they fall outside the master grading band in Table 02513-C.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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CURBS, GUTTERS, AND WALKS

GENERAL

A. These Specifications describe the construction of Portland cement concrete curbs, gutters, and walks.

QUALITY ASSURANCE

A. Concrete structure shall be constructed within ¼ inch of the indicated elevation, not deviating more than 1/8 inch from a ten-foot straightedge placed anywhere on the surface.

B. Contractor shall provide strict compliance with requirements for air entrainment and curing.

MATERIALS

A. Concrete:

1. CAST-IN-PLACE CONCRETE
2. 4,000 psi

B. Preformed Joint Filler: AASHTO M135

C. Hot-Poured Joint Sealer: AASHTO M173

PREPARATION

A. Excavate for and prepare the subgrade as specified in the Contract Documents, true to the indicated grade and cross section.

B. Place and compact a foundation of gravel borrow to the indicated thickness upon the prepared subgrade.

C. Test completed gravel foundation with a template supported on the side forms, prior to concreting

JOINTS

A. Contractor shall construct expansion joints at intervals as indicated but not exceeding 30 feet, and wherever new concrete abuts existing construction.

B. Contractor shall construct Contraction (Control) Joints using a grooving tool with a depth equal to at least ¼ the sidewalk thickness in uniform intervals not exceeding six feet. Sidewalk Control Joints shall be sawcut after concrete has set overnight.

FINISHES

A. Pedestrian and Wheelchair Accessible Ramps shall have a non-slip finish with a Detectable/Tactile Warning Surface tile.

B. All remaining surfaces shall have a broom finish.

MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

CAST-IN-PLACE CONCRETE

GENERAL

A. This section specifies the following items for Cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes for the following applications:

1. Sidewalks, Curbs, Ramps, and Roadways
2. Foundations for signage

B. Install the following items as furnished:

1. High Early Strength (HES) Cement Concrete Base Course shall be placed at curbs and between the subbase and the bituminous pavement when full depth reconstruction is less than 4' wide as indicated on the detail.

DEFINITIONS

A. Cementitious Material: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

SUBMITTALS

A. Contractor shall submit a brochure of product data for each type of product indicated.

B. Contractor shall submit the design mixture for each concrete mixture, as well as alternate design mixtures when characteristics of materials, Project conditions, weather conditions, test results, or other circumstances warrant adjustments. Contractor shall indicate the amount of flyash in the mix and the amount of mixing water to be withheld for later addition at Project Site.

QUALITY ASSURANCE

A. Contractor shall be experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Testing and Inspection services shall be conducted by the Contractor including sampling and testing concrete ingredients, design or acceptance of concrete mix proportions.

C. The Manufacturer shall be experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

D. The minimum number of test cylinders to be made for each class of concrete and for each placement will be four for each 100 cubic yards or less and minimum of four extra cylinders for each additional 50 cubic yards or fraction thereof. When additional sets of test cylinders are required beyond the normal seven and twenty-eight day tests, each set will consist of a minimum of two test cylinders.

E. Independent Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

F. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

G. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete".

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".

H. A qualified independent testing agency shall perform material evaluation tests and to design concrete mixtures.

DELIVERY, STORAGE, AND HANDLING

A. Steel reinforcement shall be delivered, stored, and handled to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

B. Waterstops shall be stored under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

CONCRETE MATERIALS

A. Cement shall be American-made Portland Cement, free from water soluble salts or alkalis which will cause efflorescence on exposed surfaces. Portland Cement shall be Type II, ASTM C 150. Use only one brand of cement for each type of cement throughout project. Contractor shall be responsible for whatever steps are necessary to insure that no visual variations in color will result in exposed concrete and shall place on order and secure in advance a sufficient quantity of this (these) cement(s) to complete concrete work specified herein.

1. Fly Ash: ASTM C 618, Type F 15-35%

2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120, 25-50%

B. High Early Strength (HES) Cement Concrete: Shall be Type III cement or an accelerator meeting the requirements of AASHTO M194.

C. Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C 33 and following additional requirements:

Sieve	Percent Passing
#4	– 95-100 (typical)
#16	– 50-85
#50	– 5-30
#100	9– 0-10

Fineness Modulus	2.80 (Plus/Minus 0.20)
Organic	Plate 2 maximum
Silt	2.0 percent maximum
Mortar Strength	100 percent minimum compression ratio
Soundness	15 percent maximum loss, magnesium sulfate, five cycles

D. Normal Weight Coarse Aggregate: Shall be well graded crushed stone or washed gravel conforming to ASTM C 33 and the following additional requirements:

Designated Size (inches)	3	2	1-1/2	1	3/4	1/2	3/8
F.M. (+/-0.20)	7.95	7.45	7.20	6.95	6.70	6.10	4.50

Organic	Plate 1 maximum
Silt	1.0 percent maximum
Soundness	5 percent maximum loss, magnesium sulfate, five cycles

E. Maximum designated sizes for normal weight coarse aggregate to be used in concrete sections shall be as noted below, except that sizes shall also be chosen in conjunction with required clearances.

1. One and one-half inches for sections over ten inches in thickness.

2. One inch for sections more than eight and up to ten inches in thickness.

3. Three-quarter inch for sections more than three and up to eight inches in thickness.

F. Water shall be from an approved source, potable, clean and free from oils, acids, alkali, organic matter and other deleterious material and complying with the requirements of ASTM C 94.

G. Admixtures:

1. Water-reducing agent:
   a. "WRDA" - W.R. Grace & Co.
   b. "PDA25" - Protex Industries, Inc.
   c. "Pozzolith 344H" - Master Builder's Co.
   d. Note: Water-reducing agent shall be by same manufacturer as air-entraining agent.
2. Air-entraining agent:
   a. "DAREX AEA" - W.R. Grace & Co.
   b. "PROTEX AEA" - Protex Industries
   c. "MB-VR" or "MB-AE" - Master Builder's Co.
3. Superplasticizer: High-range water-reducer conforming to ASTM C 494, Type F or Type G.
4. Admixtures retarding setting of cement in concrete shall not be used without written approval of Engineer.
5. Admixtures causing accelerated setting of cement in concrete shall not be used without written approval of Engineer.

CONCRETE MIXTURES

A. The Contractor shall recommend, on the basis of trial mixes and strength curves specified below, design mixes for each type and strength of concrete. The Testing Agency will verify that the proposed mix designs conform to all specification requirements.

B. Sufficient materials for concrete mix design shall be furnished by Contractor not less than five weeks before use. Duplicate small samples plainly and neatly labeled with source, where proposed to be used, date, and name of collector shall be provided and presented to Testing Agency for permanent reference.

C. Mixes shall be designed in accordance with "Method 1" of ACI 301, and the requirements of this Section. All concrete is normal weight unless specifically designated otherwise; air-dry weight not to exceed 150 lbs. per cubic foot.

D. All structural concrete shall have a minimum 28 day compressive strength of 4,000 psi.

E. Exterior concrete shall contain air-entraining admixture when tested to ASTM C 231 at the point of discharge from the truck mixer:

Aggregate Size	Air Content, %
1-1/2 in.	4.5 - 7.5
3/4 in.	5.0 - 8.0
3/8 in.	6.0 – 9.0

F. Concrete shall have the following slump when tested to ASTM C 143 at the point of discharge from the truck mixer:

Condition	Slump, inches
With Water-Reducing Agent	4-1/2 - 7
Without Water-Reducing Agent	2 – 5

G. Design mix of concrete to be used in work shall correspond to following test strengths (TABLE A) obtained in laboratory trial mixtures.

TABLE A

Minimum Strength of Lab Trial Mixes (psi)

Design	Trial Mix Strength	
Strength	7-days	28-days
4000	3400	5200
5000	4200	6200

H. Any deviation from approved mix design, which Contractor deems desirable under certain project conditions, will not be allowed without written approval of Engineer. Cost of any additional testing by Testing Agency associated therewith shall be paid for by Contractor.

MISCELLANEOUS MATERIALS

A. Epoxy Membrane Curing Compound/Concrete Sealer: The two component, epoxy resin system shall act as a dual purpose material: A membrane compound for curing alone, plus a penetrating sealer. It shall provide protection for concrete exposed to de-icing salts, commercial acids and alkalis, gasoline, diesel fuel, and oil, and exposure to freeze/thaw cycles and to vehicular traffic. The epoxy resin compound shall be furnished in two components for combining immediately prior to use in accordance with the manufacturer's written instructions as specified herein. The components of the epoxy resin system shall conform to the following requirements.

1. Component A: Poly (2 hydroxypropylene, P'p, isopropylidenephenolate) condensed with 1 chlorepropoxirane such that the ox content is 4% in aralkyl and hydroxylated solvents. Component B: The amido amine condensate of the Diels Alder adduct of polyunsaturated acids dissolved in suitable solvents. Ratio of components (A to B): 1:1 by volume.

2. Properties of Mixed Material:
   a. Viscosity: 75 to 125 cP's at 75˚F.
   b. Pot Life: 8 hours minimum at 75˚F.
   c. Minimum Solids Content: 40 to 44% by weight.
   d. Recoat Time: 24 hours maximum.
   e. Dry Film Thickness: 2 to 3 mils per coat.
   f. Color: Clear, White tint, gray tint.

3. Properties of Cured Material:
   a. The cured system shall exhibit no evidence of a mine blushing or sweating which may inhibit bond of subsequent coats.
   b. When tested according to ASTM D 968, specimens of coating cured for 14 days at 75˚F shall exhibit an abrasion coefficient of at least 30 liters per mil.
   c. When tested according to ASTM D 522, a 2 mil dry film thickness specimen cured for 14 days at 75˚ shall exceed 12% elongation when tested on the 1/4 inch mandrel.
   d. Specimens cured for 14 days at 75˚F and immersed for 48 hours shall exhibit less than 1% water absorption by weight.
   e. Water Retentivity shall not exceed 0.055 grams per square centimeter when tested according to ASTM C 156.

INSPECTION

A. Examine all work prepared by others to receive work of this Section. Commencement of work will be construed as complete acceptance of preparatory work by others.

1. Hold Point-A pre-placement inspection shall be performed by the Contractor prior to placing concrete to assure that placement prerequisites have been accomplished.

HANDLING, STORAGE, AND PROTECTION OF MATERIALS

A. All materials shall be handled and stored separately in such manner as to prevent intrusion of foreign matter, segregation, or deterioration. Do not use foreign materials or those containing ice. Remove improper and rejected materials immediately from point of use and cover all materials during construction period. Stockpile concrete constituents properly to assure uniformity throughout project.

HIGH EARLY STRENGTH (HES) CEMENT CONCRETE

A. Contractor shall furnish, set and maintain line and grade.

B. Sub-base below concrete shall be fine graded and compacted, graded parallel to the adjacent surfaces.

C. Adjacent pavement edges shall be sawcut clean edges parallel to the limits of work.

D. Forms where required shall be an approved wood or metal type of a width equal to the depth of the concrete, true to line and free from warp of sufficient strength to resist movement when concrete is placed. The forms shall be jointed neatly and tightly, set to proper line and grade and thoroughly cleaned.

E. The Contractor shall construct weakened plane transverse contraction joints every 20 feet. These joints shall consist of surface slots extended down to 1/4 inch of the thickness of the concrete. The width of the slot at the surface shall be 3/8 inch at the bottom of the slot.

F. Concrete shall be placed with minimum handling on one lift on a moist, smooth subbase. The concrete shall be struck off and float finished. The concrete shall be protected for 24 hours to allow curing.

JOINTS

A. Construction and control joints indicated on Drawings are mandatory and shall not be omitted.

B. Joints not indicated or specified shall be placed to least impair strength of structure and shall be subject to approval of Engineer.

INSTALLATION OF EMBEDDED ITEMS

A. Conform to requirements of ACI 318, paragraph 6.3, "Conduits and Pipes Embedded in Concrete", and as specified below.

B. Install steel sleeves, embedded wall plates and similar items, furnished by other trades, at locations shown on the drawings.

MIXING, CONSISTENCY, AND DELIVERY OF CONCRETE

A. Concrete shall be ready-mixed, produced by plant acceptable to Engineer. Hand or site mixing shall not be done. Constituents, including admixtures except certain corrosion inhibitors and superplasticizers, shall be batched at central batch plant. Admixtures shall be premixed in solution form and dispensed as recommended by manufacturer.

B. Central plant and rolling stock equipment and methods shall conform with Truck Mixer and Agitator Standard of Truck Mixer Manufacturer's Bureau of National Ready-Mixed Concrete Association, and Contract Documents. Consistency of concrete at time of deposit shall be as follows:

	Slump	
Portion of Structure	Recommended	Max. Range
Walls, columns	4"	3" - 5"
Slabs, beams	3"	2" - 4"

C. Ready mixed concrete shall be transported to site in watertight agitator or mixer trucks loaded not in excess of rated capacities. Discharge at site shall be within one and one-half hours after cement was first introduced into mix. Discard concrete not discharged within one and one-half hours and dispose of legally. Concrete with a temperature greater than 85˚F. shall not be placed. Central mixed concrete shall be plant mixed a minimum of five minutes. Agitation shall begin immediately after premixed concrete is placed in truck and shall continue without interruption until discharged. Transit mixed concrete shall be mixed at mixing speed for at least ten minutes immediately after charging truck followed by agitation without interruption until discharged. Concrete shall be furnished by a single plant unless accepted by the Engineer in writing.

D. Retempering of concrete which has partially hardened, that is, mixing with or without additional cement, aggregates, or water, will not be permitted.

PLACING CONCRETE

A. Remove water and foreign matter from forms and excavations and, except in freezing weather or as otherwise directed, thoroughly wet wood forms just prior to placing concrete. Place no concrete on frozen soil and provide adequate protection against frost action during freezing weather.

B. To secure full bond at construction joints, surfaces of concrete already placed, including vertical and inclined surfaces, shall be thoroughly cleaned of foreign materials and laitance, roughened with suitable tools such as chipping hammers or wire brushes, and recleaned by stream of water or compressed air. Well before new concrete is deposited, joints shall be saturated with water. After free or glistening water disappears joints shall be given thorough coating of neat cement slurry mixed to consistency of very heavy paste. Surface shall receive coating of approximately one-eighth inch thick; this shall be scrubbed in by means of stiff bristle brushes. New concrete shall be deposited before neat cement dries or changes color.

C. Do not place concrete having slump outside of allowable slump range.

D. Transport concrete from mixer to place of final deposit as rapidly as practical by methods which prevent separation of ingredients and displacement of reinforcement, and which avoid rehandling.

Deposit no partially hardened concrete. When concrete is conveyed by chutes, equipment shall be of such size and U-shaped design as to insure continuous flow in chute. Flat (coal) chutes shall not be employed. Chutes shall be of metal or metal lines and different portions shall have approximately same slope. Slope shall not be less than 25 degrees nor more than 45 degrees from horizontal and shall be such as to prevent segregation of ingredients. Discharge end of chute shall be provided with baffle plate or spout to prevent segregation. If discharge end of chute is more than five feet above surface of concrete in forms, spout shall be used, and lower and maintained as near surface of deposit as practicable. When operation is intermittent, chute shall discharge into hopper. Chute shall be thoroughly cleaned before and after each run and debris and any water used shall be discharged outside forms. Concrete shall not be allowed to flow horizontally over distances exceeding five feet.

E. Concrete shall be placed in such manner as to prevent segregation, and accumulations of hardened concrete on forms or reinforcement above mass of concrete being placed. To achieve this end, suitable hoppers, spouts with restricted outlets and tremies shall be used as required.

F. During and immediately after depositing, concrete shall be thoroughly compacted by means of internal type mechanical vibrators or other tools, or by spading to produce required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on only enough to produce homogeneity and optimum consolidation without permitting segregation of constituents or "pumping" of air. Vibrators used for normal weight concrete shall operate at speed at not less than 7,000 vpm and be of suitable capacity. Do not use vibrators to move concrete. Vibration shall be supplemented by proper wooden spade puddling to remove included bubbles and honeycomb adjacent to visible surfaces. At least one vibrator shall be on hand for every 10 cubic yards of concrete placed per hour, plus one spare. Vibrators shall be operable and on site prior to starting placement.

G. Vertical lifts shall not exceed 18 inches. Vibrate completely through successive lifts to avoid pour lines. Vibrate first lift thoroughly until top of lift glistens to avoid stone pockets, honeycomb, and segregation.

H. Concrete shall be deposited continuously, and in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within section. If section cannot be placed continuously between planned construction joints, as specified, field joint and additional reinforcement shall be introduced so as to preserve structural continuity. Engineer shall be notified in any such case.

I. Chutes, hoppers, spouts, adjacent work, etc. shall be thoroughly cleaned before and after each run and water and debris shall be discharged outside form.

FINISHING OF UNFORMED CONCRETE SURFACES

A. Smooth troweled finish: Shall be provided where concrete flatwork is to be exposed in the finished work or is to receive resilient flooring materials.

B. Floated finish: Shall be provided where concrete flatwork is to receive waterproofing membranes or setting beds for finished materials.

C. Steel Broom Finish (with smooth edging): Shall be provided at exterior concrete walks, pavements and steps.

D. Contractor, at his own expense, shall level depressed spots and grind high spots in concrete surfaces which are in excess of specified tolerances. Leveling materials proposed for providing proper surface shall be approved by Engineer.

CURING, SEALING AND PROTECTION

A. When concrete is placed at or below ambient air temperatures of 40˚F. or whenever in opinion of Engineer, such or lower temperatures are likely to occur within 48 hours after placement of concrete, cold weather concreting procedures, according to ACI 306 and as specified herein, shall be followed. To this end, entire area affected shall be protected by adequate housing or covering, and heating. No salt, chemicals or other foreign materials shall be used in the mix to lower freezing point of concrete.

B. Protect concrete work against injury from heat, cold, and defacement of any nature during construction operations.

C. Concrete shall be treated and protected immediately after concreting or cement finishing is completed, to provide continuous moist curing above 50˚F. for at least seven days, regardless of ambient air temperatures.

D. Keep a permanent temperature record showing date and outside temperature for concreting operations. Thermometer readings shall be taken at start of work in morning, at noon, and again late in afternoon. Locations of concrete placed during such periods shall likewise be recorded, in such manner as to show any effect temperatures may have had on construction. Copies of temperature record shall be distributed daily to Engineer.

E. Epoxy Curing Compounds/Hardener:

1. Apply the first coat of epoxy to the plastic concrete as soon as the bleed water has totally disappeared. This application shall serve a dual function: a membrane curing compound which shall retain 95% or more of the mixing water in the concrete for a minimum of seven days; and the first coat of a two-coat system to seal and protect the concrete.

2. After a minimum curing period of 30 days and before the structure is opened to general use, wash the concrete with cleaning and degreasing chemical solution applied in accordance with the manufacturer's instructions and as specified herein.

3. Prepare the cleaning solution in accordance with the manufacturer's instructions. Dampen concrete surface with water. Apply the prepared solution over the area to be cleaned using a soft fibered but densely filled brush. Allow the solution to remain on the surface for 3 to 5 minutes. Reapply the cleaning solution and scrub vigorously. Rinse with fresh water applied at a pressure of 400-800 psi and a volume of water per minute 5 - 10 gallons. Protect all non-masonry surfaces.

4. Allow concrete to dry a minimum of 24 hours and a maximum of 48 hours before application of the second coat of epoxy.

5. Pour equal quantities of Components 'A' and 'B' into a clean container. Mix thoroughly with a low speed electric drill equipped with a steel paddle. Keep individual components and mixed compound covered when material is not being used.

6. Application: Apply mixed epoxy compound in a uniform coat at the rate of approximately 200 sq. ft. per gallon. Mixed material may be sprayed with any equipment capable of spraying epoxy compounds, or it may be applied with a deep nap lamb's wool roller.

7. Protect surface against vehicular and pedestrian traffic during curing period (24 hours at 75˚F).

8. Final Coat - Broom Finish and Wood Float Finish: Concrete is totally sealed against contaminants and resists the attack of de-icing chemicals. It may be applied at any time after the concrete has cured a minimum of 30 days and before the structure is opened to general use. Apply the epoxy compound by spray or roller at the rate of 275 to 325 sq. ft. per gallon being careful to avoid puddles or uneven application. The concrete shall exhibit a uniform gloss indicating it is totally sealed. Any areas that are dull or flat are not totally sealed. Any areas that are dull or flat are not totally sealed and shall be given a third coat.

9. Final Coat - Steel Trowel Finish Concrete: Apply the second and final coat at any time after the concrete has cured a minimum of 30 days and before the structure is opened to general use. Apply mixed epoxy compound in a uniform coat at a rate not to exceed 200 sq. ft. per gallon. While the epoxy compound is still liquid, drop fine sand meeting the gradation requirements of ASTM C-109, vertically into the epoxy at a uniform rate of one lb. per sq. ft. Make sure entire epoxy surface is thoroughly covered. After epoxy has hardened so that it cannot be dented with a screwdriver, remove excess sand.

F. Concrete Sealer: Apply to concrete surfaces as indicated on the Contract Drawings and in the Contract Specifications. Apply in accordance with manufacturer’s instructions and the following:

1. Application of the sealer shall not alter the surface texture and shall be compatible with the use of surface finish coatings and caulkings. Surface shall dry to a tack-free condition in 4 hours or less.

2. Preparation process shall not cause any undue damage to the concrete surface, remove or alter the existing surface finish, or expose the coarse aggregate of the concrete.

3. Concrete sealer shall be used as supplied by the manufacturer and not altered in any way. Apply onto concrete surfaces at manufacturer’s recommended rate of coverage.

4. Prevent the concrete sealer from coming in contact with open joints that have not yet been filled with joint sealant, so as to prevent any loss of bond of the joint sealant.

CLEANING

Concrete surfaces shall be cleaned of objectionable stains as determined by the Engineer. Materials containing acid in any form or methods which will damage "skin" of concrete surfaces shall not be employed, except where otherwise specified.

MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

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PORTLAND CEMENT CONCRETE

GENERAL

A. This section specifies Portland Cement Concrete, including materials, batching, mixing, delivering, testing, and inspection.

B. Classes of Concrete:

1. Classes of Concrete are designated by numericals indicating the minimum 28-day compressive strength, in pounds per square inch as determined by ASTM C39, and the maximum permissible size of coarse aggregate.

2. Each ads of concrete may consist of one or more mixes determined by the types of admixtures, special aggregates, or cements used.

3. Each mix within a Class shall be considered a specific type, requiring acceptance of the design mix.

4. When the class of concrete for a particular structure is not indicated, provide Class 4000 – ¾ Concrete

QUALITY CONTROL

A. Testing and Inspection Services include:

1. Sampling and testing of concrete ingredients; design or acceptance of concrete mix proportions: and field control will be by the Contractor.

2. The Contractor agrees to accept as indicative, the results of tests, including test results involving mix designs and field quality control of concrete mixtures. If, as a result of these tests, it is determined that the specified concrete properties are not being obtained, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the specified properties, at no additional expense.

3. The use of testing and inspection services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in compliance with the Contract Documents.

4. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Engineer for final acceptance.

B. Determination of Concrete Proportions:

1. Approved Suppliers or Sources: When concrete materials to be incorporated into the work are to be obtained from suppliers or sources currently or previously approved by the Authority, and when such usage has resulted in documented performance acceptable to the

Engineer, submit to the Engineer, not less than 14 days in advance of the schedule for concrete placement, three copies each of the proposed mix design to be used for each class of concrete in the work, indicating the type, source and quantity of all concreting materials.

2. Unapproved Suppliers or Sources: When concrete materials to be incorporated into the work are to be obtained from a new or unapproved supplier or source, notify the Engineer in writing, not less than 35 days in advance of the schedule for concrete placement, as to the intended source of concreting materials. Appropriate samples of concrete materials will be obtained by or under the supervision of the Engineer. Forward such samples to the Authority's Materials Testing Laboratory for testing and acceptance. The Engineer will design and make the test trial mixtures. Proportion changes made after acceptance of initial mix designs will be permitted only as accepted by the Engineer.

3. When the concrete supplier has more than one plant in the general area of the work, only the specific plant inspected and accepted by the Engineer shall provide concrete for the work, unless otherwise specifically accepted in writing by the Engineer.

4. Do not place any concrete in the work until the mix design has been accepted as specified herein.

5. Lightweight concrete proportions will be selected to meet the maximum air-dry unit weight specified in the Construction Specifications.

C. Methods of Sampling and Testing

1. Composite Samples: ASTM C172.

2. Specimen Preparation: ASTM C31.

3. Compressive Strength: ASTM C39. The temperature of the concrete sample will be determined for each strength test.

4. Air Content: ASTM C173 or C231 as applicable.

5. Slump: ASTM C143

6. Unit Weight: ASTM C138 or C567 as applicable.

7. The minimum number of test cylinders to be made for each class of concrete and for each placement will be four for each 100 cubic yards or less and minimum of four extra cylinders for each additional 50 cubic yards, or for each 5000 square feet of surface area placed. When additional sets of test cylinders are required beyond the normal seven and twenty-eight day tests, each set will consist of a minimum of two test cylinders.

D. Evaluation and Acceptance of Tests

1. The strength of the concrete will be considered satisfactory provided the averages of all sets of three consecutive strength test results equal or exceed the specified 28-day compressive

strength, and no individual strength test result falls below the specified 28-day compressive strength by more than 500 psi.

2. Coefficient of Variation

   a. The Engineer will establish a program for the statistical evaluation of strength test results in accordance with ACI-214. The Contractor shall be fully acquainted with all provisions relative to ACI-214 and as specified herein, and fully comply with the applicable* requirements.

   b. Strength data for the determination of the standard deviation or coefficient of variation shall be based on a group of at least 30 consecutive tests for each class of concrete made on concrete produced under conditions representative of actual project conditions.

   c. The acceptance level, based on the moving average shall be equal to for, i.e., an average of three consecutive tests for concrete in which not more than one out of ten tests would be permitted to be lower than f'c.

   d. The coefficient of variation shall be assumed as 20 percent unless another value has been determined from current similar tests, or until it may be calculated from current similar tests, or until it my be calculated from the results of 30 or more job tests. This computation is described in ACI 214.

3. The Engineer may order adjustments to the mix proportions, increase in the minimum cement content or additional curing of the structure, or any combination of the above when the strength tests acceptance criteria listed herein are not being met.

4. Test Cores:

   a. When laboratory specimens produce strengths more than 500 psi below the specified strength, or if the likelihood of low strength concrete, a significant reduction in load-carrying capacity, or absence of desired durability in the concrete, is indicated, the Engineer may require tests of cores drilled from the area in question.

   b. Test cores will be in accordance with ASTM C42, and will be obtained by the Engineer. Reimburse the Authority on a time and material basis for obtaining and testing the core samples if the results of the compressive tests indicate that the design strength has not been obtained.

   c. Three cores will be taken for each determination of in-place strength. Concrete in the area represented by the core tests will be considered structurally adequate if the average of the three cores is equal to at least 85 percent of the specified design strength and no single core is less than 75 percent of the design strength. Locations represented by erratic core strengths may be retested at the direction of the Engineer. Fill core holes in accordance with the requirements of Section 03300 for Repair of Surface Defects.

5. Load Tests:

   a. If core tests do not adequately confirm the specified strength of the in-place concrete and if structural adequacy remains in doubt, the Engineer may order load test as outlined in Chapter 20 of ACI 318, or take other action appropriate to the circumstances, such as ordering additional strengthening or replacement of the affected portions of the structure, at no COST to the Authority.

SUBMITTALS

A. Contractor shall submit all design mixes.

B. Contractor shall submit manufacturer’s certificates attesting to conformance of cement with specifications. Contractor must also submit certificates slating that each admixture used is identical in composition to the sample used for acceptance testing and is compatible with all other materials in the design mix.

C. Batch Tickets Submit a delivery ticket with each batch delivered to the site, as specified in ASTM C94.

D. Mill Test Report. For each shipment of cement, regardless of quantity, furnish certified copies of mill test reports to the Engineer, prior to incorporation of the cement into the work.

MATERIALS

A. Portland Cement: ASTM C150, type as follows:

1. Type I: Use in architectural concrete and elsewhere where type of cement is not specified.
2. Type II: Use in all concrete exposed to seawater or to injurious concentrations of sulfate-containing or other chemically-aggressive solutions, or as otherwise directed by the Engineer.
3. Type III: Use only where required to obtain high early strength properties, as indicated. In lieu of Type III, provide a 15 percent addition to the specified batch weight for Type I or II.
4. Use only one approved brand of cement throughout the work, unless otherwise accepted by Engineer.

B. Admixtures: Use admixtures as specified herein and as accepted by the Engineer

1. Air-Entraining Admixtures: ASTM C260: use in all concrete.
2. Water-Reducing Admixtures: ASTM C494: use in all concrete.
3. Other admixtures, as accepted by the Engineer, may be used to provide concrete with qualities acceptable to the Engineer.
4. Use only admixtures which are compatible with each other and which produce the desired cone: properties.
5. The use of calcium chloride is prohibited.

C. Water shall be potable and exhibit no deleterious effects upon the required concrete properties.

D. Aggregates:

1. Coarse Aggregate: Well-graded crushed stone or washed gravel conforming to .ASTM C33
2. Fine Aggregate: Washed natural sand conforming to ASTM C33
3. Lightweight Aggregate: ASTM C330.

MIXES

A. Mix shall consist of ready-mixed, air-entrained concrete composed of portland cement, aggregates, water air-entraining and water-reducing admixtures, and other admixtures as accepted by the Engineer secured from a single local plant which has been inspected and accepted by the Engineer; conform to ASTM C94: capable of being placed without excessive segregation and capable of developing specified characteristics.

B. Mix shall provide concrete exhibiting the 28-day compressive strength as indicated by the class designation.

C. Cement content shall provide concrete with the minimum cement as indicated in Table 03310-A for applicable class. For concrete exposed to seawater, and concrete deposited under water, provide ten percent additional cement beyond the amount otherwise required.

D. Maximum Aggregate Size. Provide concrete mixes with maximum size of coarse aggregate as indicated by the class designation. Unless otherwise accepted by the Engineer, the nominal maximum size of coarse aggregate shall not exceed the following limits:

1. 1/5 the narrowest dimension between sides of forms
2. 1/3 the depth of slabs.
3. 3/4 the clear spacing between reinforcing bars

E. Air Content

1. Provide normal-weight concrete mixes with air content, plus or minus one percent, as indicated in Table 03310-A for the applicable class.
2. Do not place in the work, any concrete which will be subject to conditions of severe exposure, having a measured air content of less than five percent.

F. Slump: Pour inches maximum, unless otherwise accepted by the Engineer. Lower slumps may be used provided the concrete is properly placed and consolidated.

G. Unit Weight: Provide lightweight concrete mixes having the maximum air dry until weight as specified in the Construction Specifications.

INSTALLATION

A. Batch, mix and deliver portland cement concrete in accordance with ASTM C94. Batch constituents, including admixtures at the central batching plant. Add admixtures only under surveillance of the inspector. Produce concrete in accordance with ACI 301 Chapter 7 and as specified herein.

MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

DETECTABLE WARNING PANEL

GENERAL

A. This section specifies furnishing and installing composite wet set replaceable Detectable Warning Panel Units, in an in-line truncated dome pattern, embedded in curb ramps and walking surfaces at the locations and to the dimensions shown on the Drawings, in accordance with the Contract Documents and as directed by the Engineer.

B. The Contractor shall be responsible to coordinate with the local Town / City on the color of the detectable warning panel.

SUBMITTALS

A. A full set of shop drawings including the complete layout and fabrication details, composite structure, dimensions of tiled areas, and affected adjacent areas. Provide large scale plan details of the tiles at the curves, including fastener locations. Shop Drawings shall also show all pertinent characteristics of the composite wet set replaceable detectable warning panel unit, including profile, sound on cane contact amplification feature and installation methods.

B. Full brochures for all product information including Manufacturer's catalog cuts, material specifications, installation and maintenance instructions, and other data pertinent to the work of this Section.

C. A Manufacturer's certification stating that all products meet specified requirements, as verified by a certified independent testing agency. Submit certified test reports. Test report shall be current and shall not predate the notice to proceed date of this contract by more than two years. All test reports submitted shall be representative of the detectable warning panel product delivered to the Project, and shall be no more than three (3) years old from the time of the submittal.

D. An Installer Certification stating the Manufacturer's approval of the installer, if other than the Manufacturer, and detailed work history with the product proposed for installation.

QUALITY ASSURANCE

A. The Manufacturing Company shall specialize in the manufacture of modular tactile surface tiles as used in transit systems for guidance of the sight impaired. Provide composite wet set replaceable tactile Detectable Warning Panel Units as produced by a single manufacturer.

B. The detectable warning panel units shall be installed at the locations specified in the Contract Drawings.

1. The manufacturer-approved installation supervisor must be approved by the Engineer before installation of the tile may begin.

2. All anchorages of composite wet set replaceable tactile Detectable Warning Panel shall be fully embedded into cast in place concrete or bituminous concrete as noted.

3. Composite wet set replaceable detectable warning panel Units shall be suspended as part of the casting process to ensure that full bond of anchorages occurs. Composite wet set replaceable detectable warning panel Units shall not be “pressed” into wet concrete.

C. Detectable warning panel product shall meet or exceed the following test criteria using the most current test methods:

1. Water Absorption: Not to exceed 0.20%, when tested in accordance with ASTM-D570.

2. Slip Resistance: 0.80 minimum combined wet/dry static coefficient of friction when tested in accordance with ASTM C 1028.

3. Compressive Strength: 25,000 psi minimum, when tested in accordance with ASTM D695.

4. Tensile Strength: 10,000 psi minimum, when tested in accordance with ASTM D638.

5. Flexural Strength: 25,000 psi minimum, when tested in accordance with ASTM D790.

6. Chemical Stain Resistance: No reaction to 1% hydrochloric acid, motor oil, calcium chloride, gum, soap solution, bleach, and antifreeze, when tested in accordance with ASTM D543 orDl3O8.

7. Abrasion Resistance: 300 minimum, when tested in accordance with ASTM C501.

8. Flame Spread: 25 maximum, when tested in accordance with ASTM E84.

9. Accelerated Weathering of Detectable Warning Panel when tested by ASTM-G155 or ASTM G151 shall exhibit the following result: Δ E<5.0 at 2,000 hours minimum exposure.

10. AASHTO-H20 Load Bearing Test: No Damage at 16,000 # loading.

11. Salt and Spray Performance of Detectable Warning Panel: No deterioration or other defects after 200 hours of exposure, when tested in accordance with ASTM-B117

DELIVERY, STORAGE AND HANDLING

A. Composite wet set replaceable tactile Detectable Warning Panel shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings.

B. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Store under cover and protect from all damage and pilferage

WARRANTY AND GUARANTEE

A. In addition to the requirements of the General Conditions, furnish a warranty jointly executed by the tile manufacturer, the installer, and the precast concrete Precaster. The Precaster shall acknowledge, and certify that the warranty of precast concrete platform panels will not be altered on the basis of incorporation of the composite wet set rep1aceab1e detectable warning panel installation during the time of casting.

B. Composite wet set replaceable tactile Detectable Warning Panel shall be guaranteed in writing for a period of five (5) years from date of Contract's final completion. The guarantee includes defective work, breakage, deformation, and loosening of detectable warning panel material. The TWS manufacturer shall also warrant and certify that the reverse profile of the TWS Unit will not change in any way for a minimum of 10 years to insure full TWS Product

MATERIALS

A. The Modular Tactile Surface shall differ from adjoining surfaces in resiliency or sound-on-cane contact as set forth in the following accessibility guidelines. These references are intended to establish quality and performance characteristics and meet the legal definition of the law.

1. 28 CFR Part 36 – Appendix A: Standards for Accessible Design ADA Accessibility Guidelines for Buildings and Facilities (latest edition).

2. Massachusetts Architectural Access Board Rules and regulations (521 CMR) (latest edition).

3. Accessibility Handbook for Transit Facilities – USDOT (FTA-MA-06-0200-92-1) (DOT-VNTSC-FTA-92-4) (July 1992).

4. Commuter Rail Design Standards Manual – VOL 1, SEC 1: Track and Roadway, MBTA Railroad Operations (Rev No. 1 19 April 1996).

5. Massachusetts State Building Code (Current Edition).

6. In case of conflict between codes, standards, regulations, specifications, general notes and/or manufacturer's requirements, use the more stringent provisions.

B. The Modular Tactile surface system shall differ from adjoining surfaces in resiliency or sound-on-cane contact as set forth by the latest requirements of the Americans with Disabilities (ADA) and the Massachusetts Architectural Access Board (AAB). Such reference is intended to establish quality and performance characteristics and meet the legal definition of the law.

C. The Modular Tactile surface tile shall be chemically test certified to resist corrosion by sand, salt, and salt substitutes and resist color change and be resistant to ultraviolet rays. Tiles shall exhibit the following properties, and be tested using the corresponding test method, and meet the respective passing criteria, as follows:

1. Manufactured using a matte finish exterior grade homogeneous (uniform throughout thickness of product) glass and carbon reinforced polyester based SMC composite material. Truncated domes must contain fiberglass reinforcement within the truncated dome for superior structural integrity and impact resistance. A matte finish will be required on the detectable warning panel for superior slip resistance performance super

2. Property: Water Absorption.
   a. Test Method: ASTM D570 - Standard Test Method for Water Absorption of Plastics.
   b. Passing Criteria: No greater absorption than 0.35% of weight increase due to saturation.

3. Property: Compressive Strength.
   a. Test Method: ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.
   b. Passing Criteria: 13000 psi average compressive strength.

4. Property: Slip Resistance.
   a. Test Method: ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
   b. Passing Criteria: Minimum coefficient of friction of 0.80 with Neolite under wet and dry conditions.

5. Property: Impact Resistance.
   a. Test Method: ASTM D 5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling eight Gardner Impact).
   b. Passing Criteria: No cracks at ambient temperature.

6. Property: Accelerated Weathering.
   a. Test Method: ASTM G 26 - Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials.
   b. Passing Criteria: No deterioration, fading, or chalking of tile surface after 500 hrs. of exposure.

7. Property: Fire Resistance.
   a. Test Method: ASTM E 136 - Standard Method for Behavior of Materials in a Vertical Tube Furnace at 750˚C.

   b. Passing Criteria: Material shall conform to the contained criteria to be considered noncombustible.

8. Property: Flexural Strength.
   a. Test Method: ASTM D 790 - Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
   b. Passing Criteria: 15,000 psi average flexural strength.

9. Property: Stain and Chemical Resistance.
   a. Test Method: ASTM D 543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
   b. Passing Criteria: No staining or dissolution of the material.

D. Composition to that offered by a gloss finish. Use of Detectable Warning Panel products employing coatings or featuring layers of material with differing composition, performance, or color properties is expressly prohibited under this Section.

E. Color: Color shall be homogeneous throughout the composite wet set rep1aceab1e Detectable Warning Panel Units and shall be Federal Yellow per Federal Standard 595B Table IV, Color No. 33538.

F. The Detectable Warning Panel tiles shall contain a grid pattern of raised truncated domes of 0.2 inches nominal height, base diameter of 0.9 inches, and top diameter of 0.45 inches. The Federal Code of Regulations permits a truncated dome spacing range of 1.6”-2.4.” For superior wheelchair, walker and shopping cart mobility, truncated domes shall have a center-to-center (horizontally and vertically) spacing of 2.35 inches, measured between the most adjacent domes on square grid.

G. The configuration of rep1aceab1e t Detectable Warning Panel unit sizes shall be as indicated on the Contract Drawings. Replaceable Detectable Warning Panel Units shall feature a minimum of four (4) embedded corrosion resistant 1.50-inch zinc inserts with ½-inch diameter Stainless Steel fasteners, Fasteners must be covered with a structural water tight cap. Fasteners must be located BETWEEN the truncated domes (in the field) for maximum protection of the fastener integrity. Fasteners are NOT to be located in the truncated dome.

1. The field area shall consist of a non-slip textured surface with a minimum static coefficient of friction of 0.80, wet and dry.

2. At a minimum, Detectable Warning Panel product thickness shall measure 3/8” (nominal) exclusive of the perimeter 5/8” thick by 1” wide flange structure. The body if the TWS Unit must consist of a SOLID body for maximum strength and to eliminate the possibility of air entrapment and cracking. “Hollow back,” “honeycomb,” or “waffle tiles” are not acceptable for use on this Project.

H. Cleaning materials used on site shall have code acceptable low VOC solvent content and low flammability.

I. The Specifications of the concrete, sealants and related materials shall be in accordance with the Contract Documents and the guidelines set by their respective manufacturers.

INSPECTION OF MODULAR TACTILE SURFACES

A. Carefully inspect tactile supporting devices for conditions affecting application and performance of the work of this Section. All defects shall be reported in writing to the Engineer immediatly. Do not proceed with tactile tile installation work until unsatisfactory conditions have been corrected.

B. Beginning work shall constitute acceptance of its conditions and any defects in tactile tile installation work resulting from such accepted application shall be corrected without further expense to the Authority.

PREPARATION

A. Coordinate tile installation, working with prior and subsequent work of other trades.

B. During all concrete pouring and detectable warning panel installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

C. The physical characteristics of the concrete shall be consistent with the Contract Specifications while maintaining a slump range of 4 - 7 to permit solid placement of the composite WET SET “Replaceable” detectable warning panel unit. An overly wet mix will cause the composite WET SET “Replaceable” detectable warning panel unit to float. Under these conditions suitable weights such as 2 concrete blocks or sandbags (25 pounds) shall be placed on each detectable warning panel unit.

D. The concrete shall be poured and finished, true and smooth to the required dimensions and slope prior to detectable warning panel unit placement.

INSTALLATION

A. Contractor will not be allowed to install Detectable Warning Panel Product until all submittals have been reviewed and approved by the Engineer.

B. Detectable warning panel product shall be installed per manufacturer’s instructions.

C. To the maximum extent possible, the Detectable Warning Panel Units shall be oriented such that the rows of in-line truncated domes are parallel with the direction of the ramp. When multiple detectable warning panel Units regardless of size are used, the truncated domes shall be aligned between the Detectable Warning Panel Units and throughout the entire detectable warning panel installation.

D. In accordance with the latest Draft Guidelines for Accessible Public Rights of Way Sections R221, R303.3.4, R304.2, detectable warning panel product shall be located so that the edge nearest the curb line is 6” minimum and 8” maximum from the curb line, This allows wheelchair users to gain momentum before traveling over the truncated domes and it provides visually impaired pedestrians additional time to react to the detectable warning panel or advanced warning before they reach the street.

E. The detectable warning panel Units shall be tamped or vibrated into the fresh concrete to ensure that there are no voids or air pockets, and the field level of the detectable warning panel unit is flush to the adjacent concrete surface or as the Drawings indicate to permit proper water drainage and eliminate tripping hazards between adjacent finishes.

CLEANING AND PROTECTION

A. During construction and prior to opening the platform edge for public use, cover all tactile surfaces with an appropriate covering material, temporarily secured in place, to protect it from damage from construction activity. Remove covering when protection is no longer needed and dispose of it off-site in a manner conforming to all appropriate laws and regulations.

B. Protect detectable warning panel unit against damage during construction period to comply with detectable warning panel unit manufacturer’s Specifications.

C. During and after the detectable warning panel unit installation and the concrete curing stage, it is imperative that there are no walking, leaning or external forces placed on the detectable warning panel unit to rock the detectable warning panel unit, causing a void between the underside of the detectable warning panel unit and the concrete substrate.

D. Prohibit construction vehicle traffic from riding on newly tiled surfaces. Do not place or store construction equipment or tools directly on tiled surfaces.

E. Provide snow removal as required using equipment that will not damage tile.

F. If requested by the Project Manager, clean detectable warning panel Units not more than four (4) days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean tactile warning surface unit by method specified by detectable warning panel manufacturer. detectable warning panel

MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

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PAVEMENT MARKING

GENERAL

A. The work specified in this section includes the furnishing and application of reflective paint for pavement markings.

B. All work shall be completed in accordance with the Commonwealth of Massachusetts, Highway Department (MHD) Standard Specification for Highway and Bridges.

SUBMITTALS

A. Submit a schedule of pavement marking operations to the Engineer, for approval, not less than seven days prior to the proposed date of application of any pavement marking.

MATERIALS

A. Acrylic Striping shall comply with MHD requirements. Pavement striping material shall be an acrylic type, low VOC, water based paint.

1. White Color:
   a. Pigment: 58 percent minimum
   b. Total Solids: 76 percent minimum
   c. Titanium Dioxide: 1 pound/gallon minimum
2. Yellow Color Composition by Weight:
   a. Pigment: 56 Percent Minimum
   b. Total Solids: 75 Percent Minimum
   c. Titanium Dioxide: 0.3 pounds/gallon minimum

EQUIPMENT

A. Use standard commercial-quality equipment of the type normally required for application of pavement markings. Operate the equipment in accordance with the manufacturers' instructions. Truck-mounted equipment is approved for the application of pavement marking except where in the Engineer's judgment travel will be unreasonably delayed or the quality of the work performed by the equipment is unsatisfactory.

LAYOUT OF WORK

A. The Engineer will provide at a convenient location on the roadway a line of reference for use by the Contractor in establishing the location of markings. This line of reference will be at a maximum of 50-foot intervals by means deemed satisfactory by the Engineer. Follow this line of reference without deviation. Reapply any line deviating from the establishing control or of incorrect width, as directed by the Engineer.

APPLICATION OF MARKINGS

A. Apply pavement markings as follows:

MATERIAL	MATERIAL APPLICATION TEMPERATURE DEGREES F	LINE THICKNESS MILS	REFLECTORIZED BEAD APPLICATION
M7.01.08	180-195	15	6 LBS/GAL
M7.01.09	180-195	15	6 LBS/GAL
M7.01.10	40-120	15	6 LBS/GAL
M7.01.11	40-120	15	6 LBS/GAL
M7.01.03	400-425	6-188	1 LB/20 SF DROP ON
M7.01.04	400-425	5-188	1 LB/20 SF DROP ON

B. Use no thinners for the above-listed pavement marking applications except in accordance with the manufacturer’s specifications and at the direction of the Engineer.

C. Heat no paint or pavement marking material above the temperature marked on the container.

D. Heat Apply markings only in seasonable weather and in accordance with good painting practices. The surface shall be dry and free of sand, grease, oil or other foreign substances prior to the application. Prepare the surface to accept the application as part of the work of this section, with no additional compensation. The Engineer will make the final determination for all of the foregoing.

E. Bituminous concrete pavements shall have been in place for 48 hours prior to the application of pavement markings. When it is necessary to expedite the flow of traffic, the Engineer may reduce the waiting period as is deemed necessary.

F. The ambient (air) temperature for paint application is to be a minimum of 45 degrees Fahrenheit and rising at the time of marking operations. If work has started and air temperatures fall below 45˚F and continuous cooling is indicated, work shall be stopped. In cool weather conditions, temporary drops down to 40˚F will be tolerated providing temperatures also vary upwards. Sustained striping (greater than one hour) at 40˚F shall not be allowed. Starting work at air temperatures lower than 45˚F shall not be allowed.

G. If for any reason material is spilled or tracked on the highway, or any markings applied by the Contractor, in the Engineer's judgment, are of incorrect width or pattern or fail to conform to the established line of reference, remove such material by a method that is not injurious to the roadway surface and is acceptable to the Engineer, clean the roadway surface, prepare the surface for a reapplication of markings, and reapply the markings as directed without additional compensation for any of the foregoing corrective operations.

PROTECTION OF MARKINGS

A. Protect markings until sufficiently dry to bear traffic on highways that are open to traffic. Protect markings by traffic cones not less than 18 inches in height except in the case of markings which cure to a no-track condition in 180 seconds or less. In the latter case, protection may be provided by a convoy of vehicles with suitable warning devices to warn overtaking or on-coming traffic that the pavement marking operation is in progress.

B. Broken Lines:

1. On tangents and curves of 1000 foot Radius or greater, place at least one cone on every other bar.

2. On curves of less than 1000 foot Radius, place one cone on every bar unless otherwise directed by the Engineer.

C. Solid Lines:

1. On tangents and on curves of 1000 foot Radius or greater, space cones not over 50 feet apart and on curves of less than 1000 foot radius space cones not over 50 feet unless otherwise directed by the Engineer. On edge lines adjacent to the median, wider spacing may be used as directed by the Engineer. In order to control the proper positioning of the cones during the drying period, assign sufficient personnel as determined by the Engineer. Such control is dependent on traffic density, cone widths, and the like.

MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

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SIGNAGE

GENERAL

A. This section specifies furnishing and installing Aluminum signs and trailblazer signs, including supports, as indicated in the Contract Plans and as specified herein.

B. Temporary traffic signs required for constructions shall be in accordance with latest edition of the MUTCD.

SHOP DRAWINGS

A. Contractor shall provide shop drawings for fabrication, installation, and erection of all parts of the work, as well as plans, elevations and details of anchorages, connections and accessory items, and installation templates for work installed by others.

B. Take measurements in the field and verify all dimensions before submitting Shop Drawings or samples.

C. Show in detail the various portions of the work, graphic and art layouts, type of materials, size of members and method of securing same together and to work of other trades.

D. Where provisions must be made for attaching other materials to work included under this Section or where provisions must be made for assembly and installation in the field, the required cut outs and attachments shall be provided in the shop. All such items shall be indicated on the Shop Drawings.

QUALITY ASSURANCE

A. The approved Manufacturer shall be experienced in the type of work required, shall have a reputation for doing satisfactory work on time, and shall have recently successfully completed similar work.

B. Deliver and store work under this signage in a manner to prevent cracking, shipping or stress of components, and to prevent mechanical damage or damage by the elements. Damaged items shall be removed and replaced as directed.

STANDARDS

A. Except as modified by governing codes and by the Contract Documents, work shall comply with the applicable provisions and recommendations of the following:

1. The Commonwealth of Massachusetts, Massachusetts Highway Department Standard Specifications for Highways and Bridges, 1988 Edition, and its latest supplements, Sections 828 and 840 referred to as MHD.

2. U.S. Department of Transportation Federal Highway Administration Manual on Uniform Traffic Control Devices, 1978.

WARRANTY

A. Manufacturer shall provide a 10 year warranty for fading, discoloring, chipping, peeling, and weathering for painted aluminum signs.

METAL SURFACES, GENERAL

A. Use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, roughness, oil-canning stains, discoloration or other imperfections.

PAINT

A. Paint shall meet the following requirements:

1. Suitable for exposure to severe weather conditions
2. Strong, vivid, non-fading colors.
3. Semi-gloss finish

SILK SCREENING

A. Screen printed text and symbols shall utilize photographically prepared screens and shall be printed in accordance with accepted industry standards. No handcut screens shall be accepted. All screen printing shall be executed in such a manner that all edges and corners of letterforms are true and clean. Letterforms, color areas, or lines with rounded positive or negative corners, built-up edges, bleeding, spattering, etc. will not be accepted. All screen printing shall be executed from photoscreens prepared from typesetter's reproduction of the text specified, or camera ready artwork. All artwork and typesetting shall be not less than 50% of actual specified size. All inks shall be applied evenly without pinholes, scratches, orange peeling, etc. Screen printing inks shall be fast drying enamel finish.

B. All silk screening processes shall be approved by the Engineer prior to fabrication. Masking shall be done carefully so as to not leave bleeding or rough edges at painted surfaces. Spray guns used for art work shall be airless type as approved. All graphic work shall receive at least two coats of paint

MATERIALS

A. All metal surfaces used must be smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, roughness, oil-canning stains, discoloration or other imperfections.

B. Aluminum used shall be of thickness and sizes shown, constructed of 6063-T5 and 6061-T6 sheet and extrusions or other alloy as required to receive finishes indicated. Aluminum in contact with dissimilar metals shall have bituminous or other protective coating applied to the contact surface to prevent electrolytic action.

1. Aluminum traffic signs panels shall be Type A as referred to in the Standard Specifications for Highway and Bridges, MASS DPW. Sign panels shall be fabricated from flat sheet aluminum sheeting, ASTM B209, Alloy 6061-T6 not less than 0.080 inches thick.

2. The sign background shall be reflective sheeting conforming to the Federal specification L-S-300A. The reflective sheeting shall include a precoated pressure sensitive adhesive or a tack free heat activated adhesive either of which shall be applied exactly as specified by the sheeting manufacturer to recommended, properly prepared flat surfaces without necessity of additional adhesive coats on the reflective sheeting or application surface. The reflective sheeting and its application shall conform to the requirements of the Commonwealth of Massachusetts, Department of Public Works Standard Specifications for Highways and Bridges specification M9.30.1 Reflective Sheeting. The sign lettering shall be as noted on Contract Drawings.

3. There Aluminum work is indicated to the standard manufacturer’s item, construction shall be based on manufacturer's standard assembly. Where aluminum is shop fabricated, all joints, returns and the like shall be properly joined together and welded, ground smooth and finished with proper grit. All exposed welded edges shall be ground smooth to proper natural aluminum finish. Welding rod shall be of same alloy as aluminum sheet.

C. Paint used for signage shall be suitable for exposure to severe weather conditions. Paint must consist of strong, vivid, non-fading colors with a semi-gloss finish.

TYPEFACES

A. Unless otherwise noted, typefaces shall be Helvetica Neue Bold with industry standard normal letter spacing

B. Typefaces and letter spacing shall be approved by the Engineer before final manufacture.

C. Typical type and symbols layout for each sign type shall be indicated on the Drawings. All type shall be placed according to the dimensions shown on the Drawings. Should any design conflict occur in the manufacture and fabrication of the signage; i.e., type not fitting, it shall be brought to the attention of the Engineer immediately.

D. Application of all lettering, arrows, and other artwork shall be photographic silk screen. No modification of type faces or layout rules and the arrow/circle will be permitted without approval by the Engineer.

FABRICATION

A. All measurements and dimensions shall be verified on site to coordinate scheduling of work of this Section with work of related trades, with particular attention given to installation of sign supports and framing.

B. Painted Aluminum sign requirements:

1. Form Aluminum work to the required shapes and sizes, with true curves, lines and angles as shown. Provide necessary lugs, rebates and brackets for assembly of units. Use concealed fasteners where possible.

2. Make all threaded connections tight so that threads are entirely concealed. Provide abutting bars which are shouldered and headed, doweled and pinned. Pass small bars through larger bars and pin. Provide flat and countersunk heads on rivets, bolts, and screws in exposed work and elsewhere as required. Carefully machine, fit and secure removable members by means of Allen set screws of proper size and spacing.

3. Aluminum signs shall be pretreated by solvent cleaning and a wash coat of basic zinc chromate-vinyl butyrl conforming to MHD materials specification M.7.04.10.

SIGN SUPORTS

A. Standard ground mounted sign supports for Aluminum traffic signs shall be furnished and installed in accordance with Section 840 of the Standard Specifications for Highways and Bridges of MASS. DPW, Type P-5 Channel Post

CLEANING

A. Surfaces of sign work shall be cleaned as recommended by the sign manufacturer after installation and left in a condition satisfactory to the Engineer.

B. Fiberglass shall be in prime condition, free from dirt, scratches, marks and other blemishes.

C. Inspection shall be made by the Engineer to determine the condition of work. Damaged work, and work not in compliance with Contract Documents shall be rejected and replaced at no additional cost to the Authority.

MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

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TRAFFIC REGULATION

GENERAL

A. This section describes the general requirements for traffic regulation and load restrictions.

BARICADES, WARNING SIGNS AND OTHER PROTECTIVE DEVICES

A. Barricades, precast concrete barriers, PVC plastic pipe barriers, fluorescent cones, barrier fences, traffic signs, drums with flashers, or other traffic devices will be provided at locations within and around the construction area which present a hazard to motorists or pedestrians. The type, amount, locations, and duration of such devices will be as directed by the Engineer. No additional compensation will be made for protective devices. This work will be considered incidental to the item of work to which it pertains.

B. The Contractor must supply signage controls to keep the existing road operational and to maintain traffic control.

TRAFFIC OFFICER SERVICES

A. Provide such police officers as Engineer deems necessary for the direction and control of pedestrian and vehicular traffic within the site or sites. Police officers shall wear regulation uniforms.

B. Contractor is to coordinate for the appropriate and sufficient number of police details with the State, Town and/or Municipal Authority(s) having jurisdiction. Contractor shall provide confirmation and evidence of notification and required permits for the project.

MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section. All costs in connection therewith will be considered incidental to the item or items of work to which they pertain.

END OF SECTION

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CLEANUP AND DISPOSAL OF DEFECTIVE CROSSTIES AND TIMBERS

DESCRIPTION

A. The work specified in this section shall include the dispose of removed crossties, timbers and other old crossties and timbers from within the Railroad Right of Way.

DISPOSAL REGULATIONS

A. Wood materials are to be disposed in accordance with local, State and Federal regulations. Contractor shall notify the MassDOT (Owner) and MCRR (Railroad) which facility will be used to dispose of crossties and switch timber. A copy of the Mass DEP certification showing that it is an approved disposal facility along with all weight slips for crossties/timbers sent to an approved facility shall be provided to Railroad and to MassDOT Rail Division (Owner).

DISPOSAL OF OLD CROSSTIES AND SWITCH TIMBER

A. Contractor is responsible for the cleanup of all crossties and switch timber on the right-of-way including those from previous crosstie installation projects. All old crossties and timbers are to be picked up, bundled (if possible), and disposed of at a Mass DEP approved disposal site as specified in the Scope of Work. Wood pickup is to be done concurrently with installation of crossties.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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CONTINUOUSLY WELDED RAIL (CWR) INSTALLATION AND RAIL DE-STRESSING

GENERAL

A. This Section specifies requirements for installation of continuously welded rail (CWR) and includes thermal adjustment to neutral rail temperature (rail de-stressing), rail clipping and anchoring, and welding of rail and final ultrasonic testing of rail.

B. At locations where installation of welded rail is performed, thermal adjustment shall follow initial surface and alignment. Work shall also include installing bonded insulated joint-plug rails.

MATERIALS FURNISHED BY CONTRACTOR

A. Contractor shall furnish plug rails and OTM as needed. Installed plug rails shall be no less than 14’ on tangents and no less than 21’ on curves per MassDOT MW-1 to match section and wear conditions of rail in track for use in placing plug rails, or in case of failed welds, torch cut rail or gaps in rail after completing thermal adjustments.

B. Contractor shall provide Thermite type rail welds as specified in Technical Specification – WELDING OF RAIL.

C. Contractor shall provide enough new rail anchors to both replace broken or missing anchors during thermal adjustment of the rail, as indicated by the limits of work shown on the contract drawings, and enough additional anchors as required for joints that are temporarily bolted.

WELDED RAIL INSTALLATION

A. Contractor shall de-stress rail by vibration and thermal adjustment in accordance to the requirements of the Contract Plans and Specifications, and as following.

1. Prior to approval of start of work, Contractor shall participate in a pre-construction working session with representatives from Railroad Operations and MassDOT / MCRR to establish the parameters for rail adjustment, including all record keeping and timing of such. Contractor shall be fully prepared to discuss their anticipated plan of work including proposed means and methods and equipment to be used for adjusting CWR.

2. Contractor shall walk the entire section of track to be de-stressed, field verify all existing conditions and dimensions within the limits of the intended work and develop a proposed “Detailed Work Plan” to include their proposed specific locations of field cuts by track designation, station of cut end of rail string, and right or left rail determined by facing in the direction of increasing stationing. This Plan shall include a detail schedule with specific strings to be de-stressed on a day to day basis. The Plan shall be submitted to MassDOT / MCRR for review and approval prior to the Contractor commencing the work.

3. Upon approval of established parameters and the overall Plan for rail de-stressing the Contractor shall perform their first day of field work in accordance with the methods agreed to at the pre-construction working session which will be closely observed by representatives of MassDOT/MCRR and the Engineer to ensure the process is understood and will be done consistently throughout the duration of the Contract.

4. Field cuts in CWR shall be made only after receiving prior approval from MCRR. Contractor shall follow Contract Plans and Specifications for handling and moving rail. Move rail as necessary, in such a manner and by use of such equipment that will prevent bumping or striking of rail and will avoid damaging or excessively bending the rail. Contractor shall lay rail in a manner which will prevent damage to rail, ties, fasteners, and structures. Do not drop rail.

B. Cutting of Rails

1. Contractor shall cut rails square and clean, using a rail saw and/or rail torch. Torch cutting of rails is only to be done to relieve rails in tension for the purpose of de-stressing. Torch cut rail ends shall be replaced with plug rails prior to a return to service.

2. Contractor shall cut rails as outlined in the WELDING OF RAIL specification section Thermite Welding part B.

THERMAL ADJUSTMENT OF CWR STRINGS

A. Contractor shall complete thermal adjustment of CWR strings in accordance to the Contract Plans and Specifications, and as following:

1. Contractor shall cut rail at one end of the string to be adjusted, and bypass rail ends to allow string to run without restraint. Rail shall be de-clipped or de-anchored and vibrated along its entire length to allow it to adjust to ambient temperature.

2. Rail temperature shall be taken within the location or limits of immediate planned rail destressing work, after track has been allowed to adjust to ambient temperature, and just prior to rail adjustment to desired neutral temperature. The temperature reading shall be used in computation of rail adjustment. Contractor shall constantly monitor and record rail temperature readings of CWR during adjustment of rail.

3. Contractor shall determine rail temperature using an AREMA standard rail thermometer as specified in the current AREMA Manual for Railway Engineering, Chapter 5, Plan Number 34-71 or an approved non-contact infrared thermometer.

4. Contractor shall determine rail temperature by placing a conventional rail thermometer on shaded side of rail base next to web and leaving it there for not less than five minutes and until no change in its reading is detected.

5. Rail shall be adjusted starting at the end farthest from the cut end. Heating or other approved adjustment method shall proceed from that end towards the cut end. Clipping shall

immediately follow the adjustment once the calculated adjustment (movement) is obtained at each of the quarter points, half points and end point.

B. Contractor shall complete rail movement in accordance to the Contract Plans and Specifications, and as following

1. During thermal adjustment, determine the gap or rail movement between CWR strings and between CWR and bolted rail by the equation:

   G = (t – T) LK

   Where:

   G = Rail gap (inches)

   t = Zero thermal stress temperature of 95 degrees Fahrenheit

   T = Actual rail temperature at time of laying (Deg. Fahrenheit)

   L = Length of CWR being laid (feet)

   K = Coefficient of thermal expansion for rail steel (0,000078 inches per foot per degree Fahrenheit)

RAIL CLIPPING (ANCHORING or RESILIENT CLIPPING)

A. Contractor shall install rail clipping devices as specified herein and in accordance to Manufacturer's recommendations.

B. Rail Clipping Temperature

1. Clip rail at 105 degrees Fahrenheit minus 5 degrees to plus 10 degrees. When zero thermal stress temperature is obtained and proper movement has been obtained at the quarter point mark begin clipping. The movement of rail is more important than the rail temperature at time of clipping. Rail temperature shall remain within specified zero thermal stress range until rail is fully clipped. If rail temperature deviates from specified zero thermal stress range, cease clipping until rail temperature returns to within specified range.

2. When rail temperature is below zero thermal stress temperature range, an approved rail heating device shall be used for expanding CWR to make proper adjustment. When this heating method is employed, clipping operations shall begin only after proper movement has been obtained at the quarter point mark immediately behind said heater.

3. During clipping, it is necessary to ensure uniform expansion. To control this, mark the quarter points of strings on a rail and tie plate, using a metal marker as manufactured by J. P. Nissen, jr., Co. or approved equivalent, so amount of expansion can be accurately determined, then make sure each string of rail expands as follows:

   a. ¼ Point – ¼ of Required Expansion

b. ½ Point – ½ of Required Expansion
c. ¾ Point – ¾ of Required Expansion
d. End Point – All of Required Expansion

4. In the event that the first quarter or any quarter of the heated string does not have the required expansion, back up heater without applying heat to the rail and reheat and vibrate until proper expansion is obtained in the quarter.

5. Record rail temperature and related information during rail clipping process. Contractor shall keep a signed record and submit it to the MassDOT each day prior to the track being accepted and returned to service.

C. Zero Thermal Stress

1. Install, clip, join, and field weld CWR to produce zero thermal stress in rail at 105 degrees Fahrenheit minus 5 degrees to plus 10 degrees.

2. Zero thermal stress may be achieved by heating. Rail pulling shall not be allowed. Methods for artificially obtaining zero thermal stress must be acceptable to MassDOT. Take care to prevent damage to trackwork components during heating process. If damage occurs, repairs shall be made at no additional cost to MassDOT.

3. Vibrate rail during thermal adjustment to relieve internal rail stresses. Continue vibration during full period of rail length correction. Mechanical vibrators used for relieving internal rail stress shall be of a type acceptable to MassDOT and shall not damage the CWR. All CWR shall be vibrated as part of the de-stressing process.

4. Follow specified requirements for destressing rail, and procedures shown in the Contract Plans and Specification.

RAIL FASTENING

A. Rail anchors or resilient fasteners shall be removed, stored and re-used.

B. Rail clipping (anchoring) shall commence immediately after the rail has achieved the rail neutral temperature and immediately following the rail heater if that method is used to achieve rail neutral temperature.

C. Anchors shall be Unit 5 drive-on type by Amsted RPS or approved equal. Resilient fasteners shall be Pandrol "e" clip or approved equal.

D. Adjusted CWR rail shall be properly clipped/anchored per the quantities and patterns specified in: MW-1, CWR Plan and the Contract documents. The Contractor shall be responsible for providing adequate quantities of rail clips/anchors so that the requirements of these Standards are fully met.

RAIL WELDING

A. Immediately after thermal adjustment is completed rail shall be field welded and ultrasonically inspected as specified in Technical Specification – Welding of Rail, prior to returning the track to service.

B. When immediate welding of joints is not practical, said joints will be bolted per all applicable parts of MassDOT MW-1 and the CWR Plan, until that time when joint welding is performed.

REQUIRED CONTRACTOR EQUIPMENT

A. The Contractor shall submit to MassDOT / MCRR for review their proposed on-track/hirail equipment which shall consist of the following at a minimum:

1. One (1) self-propelled dual sided rail heater/vibrator with 32-burners or two (2) self-propelled equivalent single rail heater/vibrators by Flink Company, Teleweld or approved equal.
2. One or more hi-rail boom truck (grapple loader or equivalent) to enable timely transport and installation of spare rail and clipping/anchoring materials and small track equipment.
3. Hi-rail mobile rail welding unit with all necessary tools and equipment may be substituted for thermite welding at the approval of MassDOT. The Contractor will not be allowed to commence field de-stressing work until the on-track/hi-rail equipment meeting these requirements has been approved by MassDOT.

SUBMITTALS

A. Contractor shall submit name of independent contractor, a description of their on-track equipment, together with procedures and certifications for individuals qualified to perform ultrasonic weld testing in installed track, prior to initiation of testing program.

B. Within 24 hours of completion of CWR Training, Contractor shall submit proof of qualification documentation from the operating railroad indicating the names of the qualified individuals that can serve as the Contractor's designated on-site Supervisor.

C. Contractor shall submit certified final ultrasonic rail test results within 24 hours of completion of all welds.

D. Contractor shall submit the proposed "Detailed Work Plan" to MassDOT for review within 5 days of completion of walk through as described herein.

E. Contractor shall submit for approval detailed descriptions of all equipment herein, to be used to complete the work. Equipment shall be field inspected by the Engineer upon arriving on-site to determine acceptance.

F. Contractor shall submit detailed rail installation records, via As-Built contract documents, that depict beginning and end milepost stationing of newly installed CWR strings and locations of all insulated joints.

G. Submit, at the end of each day, a complete record of rail string adjustment information to be filled in on the form “Rail Clipping/Anchoring Record” included herein as part of Attachment A, the “Railroad Operations CWR Plan for Meeting the Requirements of 49 CFR 213.218”. The record shall be reviewed and approved by the Engineer on site at the end of each day. The Contractor shall then take a legible picture of the record and send to MassDOT / MCRR. Contractor shall formally submit, with a transmittal letter, a .pdf version of the reports for the preceding week, to MassDOT by the close of business each Friday.

H. All submittals will be reviewed for general conformance with the intent of the contract documents and upon approval Contractor shall commence work. This review will not relieve the Contractor of final responsibility for the means, methods, procedures and sequences to be utilized.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

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INSTRUCTIONS FOR PREPARATION OF THE REPORT OF DISTURBED TRACK (Report “A”)

A report of disturbed track will be made out as required. The report will be completed by the Foreperson in charge of the work as follows:

Part A - This part will be completed in its entirety any time track is worked and a report is necessary as outlined in the policy.

Part B - This part will be completed any time main track CWR is cut or broken for any reason. The distance over which rail movement occurred will be measured as follows:

A. Prior to cutting the rail or removing bolts from a joint and using yellow marking crayon, make a mark on the base of the rail and tie plate. These marks will be made every 50 ft. for two hundred ft. (200') in each direction. The movement at each station will be recorded in the table on the form. In the event of a rail service failure, and movement has already occurred, the anchors, clips, tie plates, etc. must be inspected for the same 200 ft. distance for evidence of movement; and any movement must be measured and recorded in the proper location.

B. After the rail is cut or the joint is broken, inspect the marks and identify the last mark showing movement in each direction from the work.

C. Measure the total distance between the marks identified in B above and record on the form.

D. In the event of a rail weld or joint service failure, the movement must be estimated by inspecting in each direction for anchor movement. After identifying the last anchors showing movement, measure and record the distance between the anchors identified.

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REPORT "A"
RECORD OF DISTURBANCE OF MAIN CWR TRACK

Part A: CWR Track Disturbance Due to Track Work

Route: ____________________ Date: _________

M.P. Location from: ______ to: ______ Track No.:_______

Type Work Executed: _____________________________

Rail Temperature:
Temp.: _____ Time: __:__ AM/PM
Temp.: _____ Time: __:__ AM/PM
Temp.: _____ Time: __:__ AM/PM
Anchoring Pattern in Accord. with MW1: (Yes/No)

If NO, explain ____

____

Ballast Section Per Standard Plan: (Yes / No)

If NO, explain Deficiency: ____

____

Part B: Rail Cut in CWR Territory

Rail: North / South / East / West

Amount of Rail Removed: _______________

Amount of Rail Installed: _______________
Distance over which
Rail Movement Occurred: _________

Remarks: ______________________________

Foreman - (PRINT) ______________________________

(SIGNATURE) ________________________

Record of Movement:

200 ft. E/N _________
150 ft. E/N _________
100 ft. E/N _________
50 ft. E/N _________
------ Rail or Joint -----
50 ft. W/S _________
100 ft. W/S _________
150 ft. W/S _________
200 ft. W/S _________

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INSTRUCTIONS FOR REPORT OF TRACK MOVEMENT DUE TO SURFACING OR OUT OF FACE TIE RENEWAL

(Report "B")

Prior to the start of high speed surfacing of curves of 3° or over; or curves having out of face tie renewal in which 1,000 ties per mile or one in three or more ties in any particular curve are renewed the Track Roadmaster or Field Engineer will set a minimum of three (3) reference points in the full body of each curve. A reference point will be set at the extreme Full Body Tags of the curve. In no case may the points be more than two hundred ft. (200') apart. These points will be set to the outside (high side) of the track, and out of the way of regulators or other equipment. A mark on the high rail, or a tack in a tie, of a parallel track (if *that* track is not to be disturbed between the time of marking and the time of measuring); a stake, or any other point that will not be disturbed during this process may be used. The distance from the reference point to the field side of the high rail will be recorded.

Immediately after completion of surfacing, the Track Foreman in charge of the track surfacing will measure and record the distances from the reference point to the field side of high rail.

Within seven (7) days after surfacing, the Track Roadmaster or Field Engineer will again measure and record the distance from the reference point to the field side of the high rail.

If uniform movement (uniform movement is defined as the average of the movement at all the stations measured in each curve) in excess of the following is detected, a Protective Temporary Speed Restriction not to exceed 30 MPH will be applied. It will be considered to have lost its neutral temperature and will have to be adjusted in accordance with Section 3.2.

Curves Under 2°	2" to the outside
	1" to the inside
Curves 2° and Over	2" to the outside
	1" to the inside

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PAGE __OF __

REPORT "B"

REPORT OF TRACK MOVEMENT

ROUTE: _______ ORIGIN DATE: __/__/__ DATE OF SURFACING: __/__/__

M.P. LOCATION from: ___________ to _________ TRACK _______

CURVE NO.: ________ Degree of Curve ____________ Elevation ______

RAIL TEMPERATURE AT WHICH SURFACING WAS DONE: _________

Distance from Reference (Reference Points Must Be No Further than 200 ft. apart):

Reference Point Number	Location of Reference Point	Before Surfacing	After Surfacing	Movement	Within 7 days	Movement
SC (Full Body Tag)						
CS (Full Body Tag)						
Uniform Movement	---------	---------				

___________________________ ___________________________

Officer Conducting Measurement SIGNATURE

Foreman Conducting Surfacing SIGNATURE

Use additional sheets if the number of stations exceeds the number of lines.

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RECORD OF RAIL CLIPPING/ANCHORING

(ATTACHMENT A)

The following form must be completed for each string of rail installed over four hundred ft. (400') in length.

STRING LOCATION: BEGINNING MP: ENDING MILEPOST:

TRACK: 1 [ ] 2 [ ] SINGLE [ ] OTHER:__________ **RAIL:** N [ ] S [ ] E [ ] W [ ]

EXPANSION POINTS:	**0**	**1/4**	**1/2**	**3/4**	**END**
RAIL EXPANSION CALCULATED: (MIN 100 DEG F)					
RAIL EXPANSION CALCULATED: (TARGET 105 DEG F)					
RAIL EXPANSION CALCULATED: (MAX 115 DEG F)					
RAIL EXPANSION ACTUAL:					
RAIL TEMPERATURE:					

RECORDED AT ANCHORING LOCATION (every 100' min.)

STATION:	**TIME**	**RAIL TEMP (deg F)**

A. AVERAGE RAIL TEMPERATURE:

FLASH BUTT WELD RECORD

WELD NO.	**RAIL TEMP. CHANGE**	**DATE**
B. TOTAL		

FINAL STRING THEORETICAL NEUTRAL RAIL TEMPERATURE (A. + B.) =

METHOD OF EXPANSION: NATURAL [ ] HEATED [ ] COOLED [ ] VIBRATED: YES [ ] NO [ ]

TIME ANCHORING STARTED: am/pm COMPLETED: am/pm

SUPERVISOR:

______________________________ (PRINT NAME)

______________________________ (SIGNATURE)

NOTES:

COMMERCIAL METERED POWER SERVICES

GENERAL

A. The Work to be done under this Section consists of furnishing, installing testing and placing in service a new 60 Hz single-phase 120/240 VAC commercial metered power service at the locations specified within Scope of Work Section of these specifications.

B. The Contractor shall coordinate the work with utility company and shall obtain all required permits.

C. This work shall conform to the standards and recommendations of the supplying power utility and the Massachusetts Electrical Code to obtain the commercial metered power services.

QUALITY ASSURANCE

A. All material and equipment furnished and installed shall conform to all applicable state and local ordinances pertaining to electrical power installations and the latest edition of the Massachusetts Electrical Code (MEC).

SUBMITTALS

A. The Contractor shall submit for approval all materials and methods of installation to be provided under this section.

GENERAL REQUIREMENTS

A. The Contractor, in coordination with the Operating Railroad shall obtain all permits, licenses, and agreements with the supplying utility company and be responsible for all user installation costs that the utility requires.

B. The Contractor shall coordinate the connection and interface of new cables and equipment with the Operating RR utilities in accordance with their standards.

C. The Contractor shall install all power cables underground at a minimum depth of 48” unless otherwise agreed to by the Engineer.

D. The Contractor in coordination with the Operating RR shall arrange for all required inspections by the local electrical inspector.

E. The Contractor in coordination with the Operating RR shall make the necessary arrangements with the supplying utility to provide the power requirements.

SCHEDULE

A. The power service shall be energized prior to the scheduled field-testing date.

MATERIALS

A. POWER SERVICE EQUIPMENT

1. The Contractor shall provide power meter enclosure, meter support facility, all required cable, and all miscellaneous material and conduits in accordance with these specifications. Meter will be provided by Utility Company.

2. Existing circuit breakers inside the instrument case shall be sized and replaced by the Contractor with new, unless otherwise directed by the Engineer.

B. SERVICE ENTRANCE CONDUCTORS

1. Service entrance conductors shall be installed in accordance with the supplying utility's requirements and the Massachusetts Electrical Code (MEC).

EXECUTION

A. GENERAL

1. The installation of the various equipment and materials for the new commercial metered power services that are specified herein and in other Sections of these Specifications shall be installed in accordance with the supplying utility's requirements and the Massachusetts Electrical Code (MEC).

2. The requirements included within this Section shall cover all incidental installation work necessary to affect an integrated, tested, and operable power supply system for the project.

B. POWER SERVICE ENCLOSURES AND LINE DROPS

1. Power service enclosures shall be installed on 30 foot (minimum) wood poles.

2. Cable connections of the service entrance conductors to the incoming utility feeders shall be made by the supplying utility.

C. GROUNDING

1. Power service grounding shall be installed in accordance with the latest edition of the Massachusetts Electrical Code (MEC), and the supplying utility's requirements. If there is a conflict the supplying utility’s requirement shall govern.

TESTING AND INSPECTION

A. Simulated load tests, in accordance with approved signal power system test procedure, shall be satisfactorily completed prior to final connection of signal facilities at each equipment location.

B. Prior to acceptance, the Contractor shall have new ac power service approved by electrical inspectors.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the allowance item listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

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SIGNAL DRAWINGS AND RECORD PLANS

DESCRIPTION OF WORK

A. This Section specifies the production and furnishing of drawings and describes the general format of drawings, types of drawings, and the manner in which information shall be displayed. The Contractor shall use the Contract Drawings as the base for preparation of drawings specified herein as required to suit the proposed system, product, manufacturing process or installation method.

The information on the Contract Drawings describing the existing facilities pertinent to this Contract is accurate insofar as it is shown. The Owner does not, however, guarantee or represent that the existing conditions conform to the Contract Drawings. It shall be understood that conditions may exist which are different from the conditions indicated by the Contract Drawings based on existing plans and that the Contractor assumes all risks regarding the cost or quantity of the work to be done because of any use which he may make of them.

B. Drawings required under this Contract shall be as follows:

1. Shop Drawings - Drawings displaying systems, subsystems, products, arrangements, layouts, etc. as designed and manufactured by the Contractor and proposed for installation. This includes existing drawings revised to depict proposed modifications to existing systems required under this Contract.

   The Contractor shall submit proposed modifications to the existing systems record drawings for each location using "X" for removal and "O" for additions or any other method previously approved by the Engineer. Shop drawings shall be prepared in accordance with the requirements of this specification and shall be a prototype of the Record Drawings. All drawings shall be prepared using Microstation CAD software in accordance with this specification. All drawings shall be prepared using the latest MCRR drawing border and AREMA signal symbols.

2. Working Drawings – Shop Drawings will become Working Drawings after they have been submitted and approved for manufacturing and installation. Working drawings shall be updated to include all revisions to shop drawings required after Engineer’s review and factory testing.

3. As-Built Drawings – Working drawings will become As-Built Drawings after they were updated following installation, field testing and cut-over of any part of Work. A complete set of as-built drawings pertinent to the location that was tested and placed in service shall be left inside instrument housing with all mark-ups made during field testing. As-built drawings shall have all information identifying final location of wayside equipment and facilities including, but not limited to locations of underground facilities such as cable trenches, raceway entrances, utility power tabs and all other system elements provided under the Contract.

4. Within seven (7) calendar days of placing in service any part of Work, the Contractor shall revise As-Built drawings to include all modifications made during field testing and submit

them for approval without the use of “X” and “O” symbols or any other revision method. Once approved, these drawings will become Record Drawings.

5. Record Drawings are intended to convey all information required to maintain signal system provided under this Contract and shall show the actual completed state of each location and the entire Project. Record Drawings shall be provided for all new work and for all modifications to existing plans. Quantities of plans for the final Record Drawing submittal shall be as specified herein.

C. Unless the effective date and identification number to be inscribed on the final Record Drawings is furnished by the Engineer all existing drawings revised or redrawn shall have revision notation stating the revision description, sequential number and the date of cut-over. Any new drawing shall have the date and description of work placed in service. The Contractor shall be responsible for the accuracy of all drawings including, but not limited to existing field conditions, signal equipment location assignments, circuit drawings and modifications thereof.

TYPES OF DRAWINGS

A. Drawings to be delivered by the Contractor shall be comply with these specifications and shall be a prototype of final Record Drawings. They shall have MCRR border, shall list previous revisions listed on the current as-in-service (AIS) drawings. Drawing set for each location shall include, but shall not be limited to the following:

1. Cover Sheet that shall bear the name of the submittal package and the name and location of the plan book in two-inch-high letters, mile post and AAR-DOT number shall be included;

2. Index Sheet that includes the drawings arrangement order, title and description including a list of relay coils and major components used on a particular sheet and future revision number. The final arrangement of drawings shall be based on a logical progression of the circuit’s sequence of operations. The drawings order and index sheet shall be approved by the Engineer. Index sheets shall reflect all the existing as well as all of the new drawings being provided so as to constitute a complete package of all the signal system drawings for each location that are part of the Project.

3. Symbol Sheet that identifies the meaning or function of all the symbols used on the drawings.

4. Nomenclature Sheet that identifies the meaning of all abbreviations and designations used in the drawings to describe wires, relays, devices, tracks, wayside equipment, and any other items.

5. Track and Cable Plan showing the track configuration, length of approaches to crossing, final location of all wayside equipment and structures pertinent to the work performed under this Contract, cable runs between points of termination, cable make-up and wire sizes, cable raceway types and sizes. Location of the conduits installed by the Contractor shall be identified. Track and Cable Plan (H Plan) shall reflect geographical correlation of the tracks and the roadway of the crossing with tracks shown horizontally.

6. Circuit Drawings showing control and indication circuits of a particular function(s) that shall be identified in the drawing title. These drawings shall identify all equipment, cable and wire termination points, contact assignments, equipment location within the instrument housing, and all other information pertinent to equipment shown.

Circuit drawings shall contain circuit nomenclature, terminal identification, fuse and resistor sizes, relay contacts identified by number and by the location of the relay on the instrument rack, usage of each relay contact, input/output points, plug connectors and wiring details. Information, such as time settings of timers, shall be shown on the circuit plans beneath the corresponding time element symbol. New and existing equipment identification, manufacturer's name, part numbers and ratings shall be shown on the Record Drawings.

7. Detail Drawings showing the arrangement of terminal boards, instruments, or components inside instrument housing or room, rack, junction box, cabinet or module.

   The contact arrangement including both the working and spare contacts of vital and non-vital relays shall be shown on these plans. The circuit plan numbers where the contacts, components, or relay are used shall be identified.

8. Installation Layout Drawings showing all details, dimensions and complete bill of material with part numbers of wayside equipment, equipment housing, dimensions relative to adjacent equipment or structures, tracks and roadway, mounting details with sizes of utilized fasteners, brackets and other elements of the layout.

9. Product Drawings showing the dimensions and internal mechanical and electrical details of particular pieces of equipment or assemblies shall bear the title of the particular piece or type of equipment shown.

10. Power Distribution Drawings showing schematic of energy distribution of systems and subsystems required under this Contract. These schematics shall be included as part of the Circuit Drawings.

11. Temporary Drawings showing required temporary work, that will not remain as a part of the completed work.

12. Wiring Diagrams showing the details of electrical connections for various parts of system equipment including junction boxes and other termination points shall bear the title of the particular piece of equipment;

13. Track Circuit Drawings showing a double line track layout with all related equipment, polarities, relay (receiver) and transformer (transmitter) ends, bonding connections, jumpers, and other equipment and connections related to track circuits.

14. Instrument Housing Layout shall be a scaled set of drawings showing instrument and entrance rack layout, location of equipment inside the housing on racks and housing walls, cable entrance details, cable distribution tray layout, HVAC ducts, housing lighting and furniture as well as equipment and terminal arrangements on cable entrance racks, equipment racks, and housing walls.

15. Material Reference Sheet showing description, nomenclature, part numbers and ratings for all materials and equipment provided.

16. All other drawings that are required to illustrate all proposed and/or completed work as specified herein or requested by the Engineer.

QUALITY ASSURANCE

A. All drawings submitted by the Contractor shall be in accordance with the industry standards for AHCW circuit and detail design. Approval of the Drawings shall be at the discretion of the Engineer. Prior to submittal, verify that the drawings conform to the Contract requirements specifically addressing the following:

1. Use of AREMA Standard Symbols and nomenclature.
2. Conformance to the Specifications.
3. Logical grouping and arrangement of subject matter.
4. Accuracy.
5. Legibility.
6. Neatness.
7. Line quality.
8. Lettering quality.
9. Reproduction quality.
10. Lack of clutter and minimum of crossed lines.
11. Inclusion of interfaces with related contracts.

B. During the review of submitted drawings the Engineer will consider the points enumerated above, with the basic criteria for obtaining approval being that drawings are easy to read, understand and use.

DRAWINGS SUBMITTALS

A. Drawings shall be submitted in accordance with requirements of Submittals Section of these specifications. Prior to production of plans submit a sample of project drawings 11x17 inch size with the railroad border and title block provided by the Engineer.

B. All drawings germane to the product, subsystem, or location shall be grouped together and submitted at the same time. This logical grouping of drawings shall be referred to as a submittal package.

C. Modifications to existing facilities and proposed temporary work marked with "O” and "X” or other approved method shall be submitted four (4) weeks prior to the scheduled date of implementing work.

D. When recording work in progress use green color to show conditions that are acceptable, brown for contacts verified, red for circuit changes to be added, and yellow for circuit changes to be removed. The Contractor’s approved signal engineer shall sign and date all circuit testing and changes. As revisions are made, they shall be copied to all prints at each location.

E. As-Built Drawings with all revisions clearly marked shall be left inside each pertinent instrument housing (SIH, Case, JB, etc.) after placing in service any portion of the work, unless otherwise directed by the Engineer. One paper copy shall be delivered to the Railroad office, and one shall be submitted to the Engineer for approval. As-built drawings will be the As-in-Service (AIS) drawings until replaced with approved Record Drawings.

F. After approval of as-built drawings and completion of all “punch list” items the Contractor shall submit a complete set of final Record Drawings as specified herein. Record Drawings shall incorporate all modifications made during final cut-over of each part of every phase of the implementation of the Contract. Record Drawings shall have no “X” and “O” symbols or other means of drawing modifications.

G. Within seven (7) days of completing punch-list items the Contractor shall submit the Record set of drawings that shows the final configuration of the AHCW system at each location.

H. Record drawings shall be provided as follows:

- One printed 11”x17” set shall be delivered to each signal location and placed inside the instrument housing to replace as-built set left after cut-over.
- Two (2) sets 11”x17” of all Record Drawings bound in a protective covering shall be delivered to the operating railroad office.
- MicroStation CAD files and PDF files for use on a Windows based PC shall be delivered to the operating railroad or as directed by the Engineer.

MATERIAL

A. Electronic files of all drawings shall be in the most recent release of MicroStation available. The Contractor shall maintain an electronic copy of the Project CAD files for a period of not less than five years at his facility.

B. Supply a matrix of layer names and colors for all drawings. Review plotting procedures with Railroad’s CAD personnel and ensure all drawings can be plotted satisfactorily using Railroad owned equipment.

C. CAD Standards used for creating and plotting drawings such as pen weights, text heights, colors, etc. shall be obtained by the Contractor from the Engineer. No x-ref files shall be utilized.

D. All copies of plan books and submittal drawings shall be bound with a protective cover and backing as manufactured by Wilson & Jones or approved equal.

BASIC FORMAT REQUIREMENTS FOR DRAWINGS

A. Drawings shall not be crowded or cluttered, but shall be arranged to be easily readable. Circuitry shall be presented on the drawing with a minimum of crossed or offset lines. Where applicable, a schematic track diagram shall be included to show the area of work.

B. Complete circuits shall be shown on each drawing insofar as practicable. Circuit continuations shall be kept to a minimum. When circuit continuations are used, they shall be clear and specific and shall include the identity of circuit, reference letter and continuation sheet, even when continuation is on the same sheet.

C. New drawings requiring continuation of, or match lines to, existing drawings shall match the existing drawings in format, relative placement of equipment, cables, tracks, and other items depicted on the drawings.

D. When circuit continuation is required, the reference to continuation shall have a circuit nomenclature, circle with a letter at the end of the line depicting wire, and sheet number where continuation is shown.

E. Local or equivalent circuits shall be drawn with relay coils, timers, motors, or other operated devices shown near the right or left border of the drawing wherever practical. Where there is a choice the right border shall be favored. Contacts in circuits shall be laid out in geographical succession insofar as possible and practical.

F. Circuits shall be arranged to geographically match the track layout. South is preferred to be to the right. On line circuit plans, only line circuits shall appear on the right and left sides of the drawing. Circuits between two or more locations shall be shown on one page, insofar as possible and that page shall be incorporated into the plan book for all locations included.

G. Relay nomenclature shall be printed in three lines, as follows:

Top – Coordinate	(3A2)	(15B6)
Middle - Name Identification:	10-2N	10-3
Bottom - Function Description:	AS	NWCP

H. Relay nomenclature shall appear above top of coil or contact.

I. Stick contacts shall line up under the coil of the controlling relay. Relay contacts shall line up with the controlling coil and other contacts of the same relay insofar as practicable. Different relay contacts and coils shall not line up.

J. A minimum distance of 0.40 inch shall be maintained between lines representing circuit wiring. Lettering or printing shall be at least 0.10 inches high. All spacing shall be in multiples of tenths of inches.

K. All track and cable drawings shall show the survey stations for all wayside equipment, junction boxes, signal instrument housings and related structures.

L. All circuits shall reflect the actual wiring indicating all contact and terminal numbers. When the final circuit is wired differently from the Contractor's drawing, revise the drawings to indicate the actual wiring before preparation of As-Built drawings.

M. The arrangement of circuitry shall be in such a manner that no more than two wires shall be shown connected to a single terminal or contact pin. A uniform method shall be used to indicate the actual location of double wire connections when it is not desirable to show both wires at the point of termination. Wires shall be shown at the actual point of termination.

N. Use symbols and nomenclature as shown on the Contract Drawings and specified herein, unless otherwise directed by the Engineer.

O. All modifications to existing plans shall be prepared by reproducing the original existing drawings in CAD and then adding all proposed revisions. The modified existing plans shall be submitted for approval as all project drawings and shall be approved by the Engineer prior to implementing proposed modifications to existing system.

P. Unless otherwise directed by the Engineer, all CAD drawings prepared by the Contractor shall be as follows:

DRAWING REQUIREMENTS:

a. Drawing Lines shall be continuous from start to finish.
b. Any filling shall be solid no hatched fills.
c. All track circuits shall be shown with the track layout.
d. The Contractor shall have their Logo in revision box.

WORKING UNITS

The working units' settings are as follows:

Unit Names:	
Master Units:	IN
Sub Units:	TH
Resolution:	10 TH Per IN, 1000 Pos Units Per TH
Working Area:	429496 IN

GRID SETTINGS

The grid has been set as follows:

Master/Grid:	0:1.0000
Reference Grid:	10
Configuration:	Orthonal
Aspect Ratio (x/y):	1.0000

LOCK TOGGLES

a. The gridlock toggle shall be on whenever possible.
b. The unit lock toggle shall be on for all element placements. Unit lock Distances (UR) have been set in the seed file for 0:0.5000 between grid marks.
c. The snap toggle shall be on.
d. The remaining locks shall be turned off.

GLOBAL ORIGIN

a. The (GO) control is where the X, Y=0,0 point is located with respect to the design plane.
b. The Global origin has been set to the lower left border of the drawing inner borderline.

LEVEL SYMBOLOGY

The level symbology shall be turned on at all times.

TEXT

Engineering Font #3 shall be used for all text.

TEXT SIZE

The following sizes shall be used for all text:

a. General Text, Notes, Equipment Description and Line Tagging.

Height	0.1000
Width	0.1000
Line Spacing	0.5000
Line Length	255
Interchar Spacing	0.0000
Slant	0.0

b. Headings and Title Block Information:

Height	0.2000
Width	0.2000
Line Spacing	0.5000
Line Length	255
Interchar Spacing	0.0000
Slant	0.0

TEXT PLACEMENT

All text shall be placed with the unit locks on. Line tag text shall be centered 0.500 tenth’s above the line. “Data Fields” shall be used where provided in accordance with the cell library.

TEXT JUSTIFICATION

The preferred justification settings are:

TXJ= LC, CC or RC
TNX=LC, CC or RC

CELLS

a. Cells used in drawings shall not be “Dropped Status” and rearranged.
b. Cells and Drawings that require filled in areas will solid fills and not hatched fills.

VIEW ATTRIBUTES

The following view attributes shall be adhered to. View #1 shall be displayed on the main screen and view #7 displayed on the other screen if equipped. (See Attached View Attributes Chart).

PLOTTING

a. View #7 is standard plotting view.
b. All plots shall be 11”x 17” size unless otherwise requested by the Engineer.
c. All plots shall be clear and legible.
d. Plots shall be plotted in black and white.
e. Level Symbology and Line weights turned on.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

AUTOMATIC HIGHWAY CROSSING WARNING SYSTEM

GENERAL

A. This Section specifies the work to be performed by the Contractor which consists of designing, furnishing, installing, testing and placing in service the upgrade to Automatic Highway-Rail Grade Crossing Warning (AHCW) systems at the locations listed within the Scope of Work Section of these specifications.

B. The Contractor shall provide all labor, material, equipment and hardware required for safe and reliable operating AHCW System as described herein and shown on the Contract Drawings. The existing grade crossing warning control systems that currently activate the warning devices at each of these crossings shall remain in place, except where control equipment is specified for upgrade.

C. The Contract Drawings provided are representative only of the general principles and concepts upon which the Contractor shall base their design. The Contractor is responsible for the specific layout and location of AHCW equipment proposed for installation.

D. The Contractor shall provide protection-in-place of all existing and new equipment during construction. The Contractor shall replace all equipment and facilities damaged during construction with new in-kind equipment and facilities at no cost to the Contract.

QUALITY ASSURANCE

A. The design and workmanship of the apparatus shall comply in every respect with the “Rules, Standards and Instructions for the Installation, Inspection, Maintenance and Repair of AHCW Systems,” as set forth by the latest edition of Federal Railroad Administration (FRA) Highway Railroad Grade Crossing Rules and Regulations Governing Testing Maintenance and Inspection, latest edition.

B. The Contract Drawings illustrate the final conditions at these crossings**.** These Plans are intended to illustrate the layout criteria necessary to implement the basic requirements of the Contract. It shall be the Contractor’s responsibility to finalize the system design, receive approval of the Engineer and provide as-built record drawings after acceptance of work by the railroad and state or federal regulatory authorities having jurisdiction for review and approval.

C. The AHCW system and all its elements shall be of the most modern type, including the latest equipment versions and designs, which shall provide the highest degree of safety and reliability for train service. The AHCW system shall be so designed as to meet all the applicable Signal Manual Parts of the American Railway Engineering and Maintenance Association (AREMA), except that where the word “may” appears in the Manual, as part of a directive, the word “Shall” is to be substituted.

D. Unless otherwise specified herein, all items furnished and installed under this Contract shall be in accordance with applicable sections of AREMA, Institute of Electrical and Electronic Engineers IEEE, NEMA, FRA Part 234 and 236, Manual on Uniform Traffic Control Devices (MUTCD) Part

VIII, and the operating railroads standards, practices, and recommendations. In cases of conflict the priority shall be:

1. Federal, State, and local laws and regulations
2. Manual on Uniform Traffic Control Devices (MUTCD)
3. State and Local Permits
4. Contract Drawings
5. Contract Specifications
6. MassDOT Standards
7. Operating Railroad Standards and practices
8. AREMA Communications & Signals Recommended Practices
9. Institute of Electrical and Electronic Engineers (IEEE) Standards
10. NEMA Standards

E. All apparatus, including the signal junction boxes and all other miscellaneous components that form a complete system, shall be furnished completely factory wired and tested.

F. The Contractor shall complete the testing and inspection of the equipment prior to shipment in accordance with the approved Factory Test and Inspection Procedure.

G. All components and products provided under this Contract shall be new and free of manufacturing defects and shall be clearly and permanently labeled with value and type.

H. All electrical components shall be rated to operate at power, voltage, current, and temperature levels exceeding by 20 percent those which the components will be subject to in service, unless otherwise specified herein.

SUBMITTALS

A. Submittals will be reviewed for general conformance with the intent of the Contract Documents only. This review will not relieve Contractor of final responsibility for the means, methods, procedures, and sequences to be utilized. All submittals shall comply with the Submittals section of these specifications.

B. The Contractor shall submit the following for approval:

1. Catalog cuts, shop drawings, fabrication drawings and descriptive literature for all equipment and material proposed to be furnished under this Contract shall be shown in accordance with a detailed bill of materials on a per location basis.

2. Every submittal must clearly identify the intended use and proposed application of submitted material for submittal to be reviewed. Submittals that do not comply with this requirement will not be reviewed and will be rejected regardless of the contents.

3. The assembly drawing of each AHCW layouts.

4. Detailed installation drawings for each layout indicating the specific location, equipment dimensions and distances to roadway and railroad elements.

5. The sizes and types of all cables and internal wire that the Contractor proposes to furnish and install.

6. Drawings showing the existing as-in-service (AIS) circuits and wiring diagrams shall be field verified prior to beginning of construction to ensure accuracy. Any inconsistency between existing drawings and actual installation shall be addressed with the railroad representative on site, marked on the field copy retained inside the housing and on the copy of project AIS drawings.

7. The Contractor shall submit drawings showing proposed modifications to the existing crossing layout and circuits, including proposed modifications to the existing equipment arrangement within instrument housing if required to install approved equipment.

8. All work shall be performed in accordance with approved circuits, detail plans and installation drawings. After completion of installation, testing and placing in service a crossing the Contractor shall provide one set of revised marked-up plans and test forms to remain inside the instrument housing and shall submit another set for approval.

DELIVERY, STORAGE AND HANDLING

A. All equipment shipped shall be properly fastened and braced to prevent damage during transit. Any equipment damaged during transit shall be replaced at no additional cost to the Contract.

B. Batteries shall be shipped filled to the correct level and in a fully charged state. Each battery shall be equipped with transit plugs, or rubber stoppers, to prevent spillage of the electrolyte. Batteries shall be shipped separately from the housing.

C. All cable shall be shipped on reels, adequately protected from damage in shipment by heavy wrapping or wood lagging to avoid the reels moving obliquely against each other. The manufacturer shall also be responsible for any change in the shape of the cable occurring in normal transit which results in an increase in the maximum diameter beyond that specified. The external protective wrapping on reels shall be secured by at least two steel bands to ensure damage free shipment.

D. Each length of cable shall be wound on a separate reel. Reels shall be able to withstand handling and shall be so designed that the inner end of the cable is secured and accessible but protected from injury. If the inner end of the cable projects through the flange of the reel, the inner end shall be protected by a suitable cover of metal having rounded ends and sides and securely fastened in place to protect the cable end. Both ends of cable on reel will be secured in place, to prevent their becoming loose in transit or handling of reel. The diameter of the reel drum shall be at least (14) times the cable diameter to prevent damage to the cable during reeling. The arbor hole shall admit a spindle 2-1/2 (two and a half) inches in diameter without binding. The reels shall be designated and constructed as nonreturnable when drum size and cable weight and volume permit. The maximum width of reel shall not exceed 48 inches unless otherwise specified.

E. After passing factory tests, cable shall be effectively sealed against the entrance of moisture. Both ends of each length of cable shall be protected by wrappings of rubber tape and plastic tape, an effective boot taped or sealed into place, or other suitable means approved by the Engineer. The use of friction tape, other than an external mechanical protection over an adequate rubber and/or plastic tape, will not be accepted. The cable end protection will be adequate to protect the cable in shipment and prolonged external storage in the weather if not immediately employed without regard to the position of the reel while so stored.

F. Cable shall be closely and tightly wound, in a uniform manner, in each layer on reels. An arrow shall be painted on one head of each reel pointing the opposite direction from the outer end of the cable with the words "Roll This Way" employing letters not less than 3/4 inch height and an arrow not less than six inches in length and 1/2 inch in width.

G. LED units shall be packaged separately from flashing light units in which they are to be used.

MATERIALS

A. All equipment specified herein shall be manufactured and supplied by one manufacturer as a complete system package unless otherwise approved, to ensure proper integration of components into a complete highway crossing signal layout. Manufacturers shall be Alstom, Siemens, Western Cullen Hayes, Hitachi Rail (Ansaldo STS) or approved equal.

B. Highway crossing warning equipment shall meet the requirements established by AREMA Signal Manual, Automatic Highway-Rail Grade Crossing Warning Systems, Part 3.3.1, and Recommended Functional/Operating Guidelines for Control of Automatic Highway–Rail Grade Crossing Warning Systems, Part 3.1.15, except where such instructions and requisites conflict with this specification.

C. FLASHING LIGHTS SIGNAL LAYOUT

1. The flashing light signal layout shall be equipped with a standard reflective Railroad Crossing Sign (crossbuck), flashing light units, and, where required, electronic bell, number of tracks sign (if required for multiple track crossings) and “tell-tale” strobe as specified herein and shown on the Contract Drawings.

2. The flashing light signal shall be 12-inch L.E.D. uniform look type in accordance with these specifications and also conform to AREMA Signal Manual, Parts 3.2.5, 3.2.35 and 3.2.50.

3. Flashing light signal assemblies shall be double direction back-to-back or single direction as shown on the Contract Drawings and shall be provided complete with new cross arms, junction boxes, elbows, brackets including all required mounting hardware.

4. Each lamp housing shall be constructed of a rigid material which is not affected by atmospheric conditions or by changes in temperature as defined by Class B in AREMA manual part 11.5.1. A protective finish shall be applied to housings made of materials susceptible to corrosion, weathering, and degradation from ultraviolet rays or other elements identified in Class B in AREMA manual part 11.5.1. The housing shall be equipped with a door with front access, hinged at one side with a weatherproof seal. A ventilation opening shall be provided at the bottom of the housing and covered with brass, or copper, wire screen. A sidelight shall be provided on both sides of the lamp housing complete with gasket, lens, and retainer.

5. All masts shall be 16' minimum height, 5” diameter (except when otherwise indicated in these Contract Documents), of aluminum construction complete with pinnacle cap and aluminum split base junction box. Pinnacle cap will not be required when bell is or tell-tale strobe is used.

6. The contractor shall ensure that the crossing masts provided are of sufficient height to maintain the required minimum clearances and support the multiple flashing light and gate configuration of each layout. A strip of ASTM Type III or Type V retroreflective white material not less than two inches in width, shall be used on each mast for the full length of the front and back of the mast from the crossbuck sign or number of tracks sign to junction box base, unless otherwise directed by the Engineer.

7. The LED signal module shall be 12 inches in size and shall have either a clear or red lens. White LED sidelights shall be included. Any gasket or similar sealing material shall be made in accordance with AREMA Manual Part 15.2.10 (Recommended Functional Guidelines for Gasket Material Suitable for Circuit Controllers, Signal Cases and Other Signal Apparatus Housings).

8. The LED signal module shall operate over an ambient temperature range of -40ºF to 158ºF per AREMA part 11.5.1. It shall be protected against dust and moisture intrusion as per the requirements of NEMA Standard 250-1991, Sections 4.7.2.1 and 4.7.3.2, for Type 4 enclosures.

9. The LED signal module shall meet mechanical vibration and shock requirements as per AREMA Signal Manual Part 11.5.1., and the lens shall be UV stabilized.

10. Cross-arms for flashing light units for signal layout without gate shall be in accordance with AREMA Drawing, Part 3.2.50 as approved by the Engineer.

11. Railroad Crossing Signs (Crossbuck R15-1) shall be white reflex-reflective sheeting on sheet aluminum with the words 'RAILROAD CROSSING' in black letters, and a 5 inch reflective stripe on the rear, in accordance with MUTCD, Chapter 8B, Section 8B-03 and RAILROAD Standard Plan E190.

12. Flashing light signal assemblies shall have uniform look and shall be as manufactured by GE Lighting (RG6), Western Cullen Hayes (WCH) Model 985-801, Alstom Signal Type

AURORA, Siemens (Safetran) FLX-4000 LED, Hitachi Rail (Ansaldo) Type HC-120, or approved equal.

13. Electronic bell shall be provided with a weatherproof housing and installed at the top of the mast instead of pinnacle at location shown on the Contract Drawings and approved by the Engineer. The housing shall be constructed of aluminum. The bell shall conform to AREMA Signal Manual, Part 3.2.61. Normal operating voltage shall be 10 volts dc. Electronic Bell shall be as manufactured by General Signals, Inc. or approved equal, shall have no moving parts and the sound shall closely resemble sound and volume of mechanical bell. It shall be controlled by the same AHCW equipment as mechanical bell and require no additional wiring.

D. AHCW GATE LAYOUTS

1. AHCW gate layouts shall be complete with gate mechanism, gate keepers, gate arm, counterweights, LED gate arm lights, high-wind brackets, mast mounted flashing light units, railroad crossing signs, number of track signs, extension brackets for signs, and, where required, bell(s). For gates that do not require a bell, the signal mast shall have a pinnacle together with all necessary hardware as specified herein, in accordance with AREMA C&S Manual, Part 3.2.15, and as shown on the Contract Drawings.

2. The ground-mounted mast for supporting a gate mechanism shall be constructed of five inch diameter aluminum pipe, complete with pinnacle cap and cast aluminum split base with double sided junction box. Junction boxes shall be provided with AREMA terminals, gaskets, and provisions for padlocking both sides. The gate mechanisms shall be supplied with an internal wiring diagram protected by a plastic laminate and shall be fastened to the inside of mechanism cover. Binding posts, nuts, washer and insulators shall conform to AREMA C&S Manual, Part 14.1.11.

3. The highway crossing gate mechanism shall be Western-Cullen-Hayes, model 10 layout with mechanism 3597 or approved equal. Mechanism shall include 115VAC nominal heater element to prevent formation of frost on controller contacts. The Contractor shall refer to gate mechanism manufacturer's wiring requirements to ensure that required operational voltage does not drop below the voltage specified by the manufacturer.

4. The general design, painting and striping of the gate arm shall conform to AREMA C&S Manual, Part 3.2.20 or 3.2.24. The striping shall consist of 16-inch alternate reflectorized red and white stripe on both sides of the arm. The arm shall be constructed of non-conductive fiberglass and be designed to ensure reasonable durability and rigidity to prevent undue sway or whipping. The clearance between the gate arm and any fixed portion of the assembly shall be a minimum of two inches.

5. The highway crossing gate arms shall be of sufficient length to extend to within one foot of the centerline of the roadway but in no case less than 90% of the roadway width and provide a minimum clearance of two feet from overhead wire and cable.

6. All roadway gates shall be equipped with high wind support devices. The wind support devices shall be as specified in AREMA C&S Manual, Part 3.2.22.

7. All roadway gates, except those mounted on cantilevers, shall be equipped with self-restoring gate arm devices. The self-restoring gate arm devices shall be as specified in AREMA C&S Manual, Part 3.2.23 and shall operate with a gate 32 feet or less in length. The self-restoring gate arm devices shall be by-directional and shall allow for arm rotation parallel to the roadway for maintenance as manufactured by Western Cullen Hayes "Gate Gard", National Electric Gate Co. "Gate Saver", and General Signal Industries "Gate Keeper" or approved equal. Additional counterweights shall be provided as required.

8. Ten volt weatherproof, bi-directional LED gate arm lights shall be provided in accordance with AREMA C&S Manual, Part 3.2.40 with highway crossing red lenses. Gate arm lights shall be adjustable to permit focusing of lights at gate installations parallel to the tracks but not perpendicular to the roadway.

9. A mechanism support shall be furnished with each gate mechanism. The mechanism support shall provide a base upon which the gate mechanism rests and shall support the weight of the mechanism when it is necessary to swing the mechanism and gate for repairs. Mechanism support shall be similar to WCH 3565-380A, or approved equal, and shall be complete for mounting on a 5" pipe.

10. Crossarms for flashing light units installed on the signal with mast mounted gate shall be in accordance with AREMA Signal Manual, Part 3.2.51, as approved by the Engineer.

E. WIRING

1. Internal wiring for vital circuits shall be in accordance with applicable AREMA Signal Manual Parts, unless otherwise specified herein. No. 16 AWG 19 strand flexible wire shall be used for all circuits, except for No. 10 AWG, or larger, flexible stranded shall be used for signal lighting, track connections to the main terminal board and battery and rectifier bus circuits. Solderless terminals, for stranded wire, shall be in accordance with these specifications.

2. Solid terminal connectors shall be used for all short terminal jumpers.

F. WIRING RACEWAY

1. All internal case wiring shall be contained within surface mounted plastic raceway. Raceway shall be of a polycarbonate, low smoke type with a solid snap-on cover and flexible side walls. The side walls shall be of "finger" type construction allowing for insertion and removal of wire runs with terminations attached. Sizes shall be determined by the manufacturer. Fill capacity shall not exceed 40%.

G. PAINTING

1. The exterior of non-aluminum housings shall be painted in accordance with AREMA Signal Manual Part 1.5.10. The finish color shall be aluminum. The battery trays shall be painted with two coats of acid-resistant black paint.

2. All paint shall be fire retardant.

H. POWER OFF AND EQUIPMENT STATUS INDICATION LIGHTS

1. The Contractor shall design, furnish and install a power-off indication lights on both sides of new and existing instrument housings to be visible to the train crew. The control circuit shall include Power Transfer relay or other proposed and approved method of power-off indication. It shall be installed inside instrument housing and shall keep the power-off lights lighted when power is on.

2. Power-off indication lights shall be twelve-volt LED. Lights and bases shall be mounted inside the crossing instrument housing behind a single "fisheye" Lexan lens equipped with a gasket and a silicon seal to weatherproof the opening in case wall.

3. The Contractor shall submit and obtain approval of the proposed power indication system prior to providing equipment.

4. Equipment status indication (Tell-Tale) strobe light shall be provided for installation instead of pinnacle on top of the 4" or 5" DIA mast at the location clearly visible to the train crew as approved by the Engineer. Tell-Tale strobe shall be activated by the AHCW control equipment to indicate the status of warning equipment. Tell-Tale strobe shall be permanently mounted LED type white color strobe beacon equipped with white dome L10 series manufactured by Whelen Engineering Co. or approved equal.

I. AHCW CONTROL EQUIPMENT

1. AHCW equipment shall be controlled by programmable Crossing Controllers (SSCC III Plus as manufactured by Siemens) or approved equal and shall be installed inside instrument cases at the locations specified in Summary of Work section of these specifications. Crossing Controllers shall support:

   a. Pre-loaded user-selectable train detection program

   b. Four (4) gates with lamps and bells, or 2 gates with lamps and bells and cantilever with lamps

   c. Programmable track Out-Of-Service feature

   d. Isolated gate control

   e. Voltage regulated adjustable lamp outputs

   f. Programmable vital control inputs (up to 8 including one input for GP)

   g. Non-volatile real-time clock with optional daylight savings

   h. On-board event memory

   i. Programmable lamp flash rate

   j. Optional synchronized lamp flashing of multiple units

   k. Programmable gate control delay (40-Ampere unit includes second GC, inverted GC or

l. pre-emption relay drive, or advance warning sign beacon relay drive)

m. Optional “bell off” condition while gate is rising

n. Enhanced Crossing and lamp test modes

o. Configurable application and test timers

p. Optional Loss-Of -Shunt selection with configurable timers

q. A/B outputs enabled (40-Amp units only)

r. Password protection (can be enabled/disabled)

s. • Programmable low battery indication threshold

t. Solis State • Maintenance Call output

u. Gate delay and GP flashing lamp control

v. System health monitored by the CPU

J. TRAIN DETECTION

1. The Contractor shall provide new Motion Detecting equipment as part of the new crossing control instrument case at locations specified within Scope of Work. Motion Detecting system shall be PMD-4R as manufactured by Alstom or approved equal.

2. The existing Motion Detector equipment shall be replaced with new PMD-4R using interface specifically manufactured for the purpose of replacing outdated equipment at the locations specified within Scope of Work.

3. The motion detecting equipment provided shall include train motion detection, crossing island train detection, vital inputs monitoring and vital relay drive output control. The motion detecting equipment shall have provisions for expansion to wireless crossing control and prediction capabilities with the optional selective function upgrade.

4. Motion Detector shall have a built-in recorder that logs time-stamped vital and non-vital events as well as state changes, crossing performance data, and failures/reset information. All recorded events shall be user printable both track-side and in the office. The Motion Detector shall consist of a central processor, track and I/O controllers, communications interface and LCD display with keypad/button interface. Front panel indicators display module shall provide health status and indicators for monitoring active I/O signals.

K. CONSTANT WARNING TIME CROSSING PREDICTOR

The Contractor shall provide crossing control system based on constant warning time (CWT) control equipment (predictor) at locations specified within Scope of Work. The CWT equipment shall be ElectroLogIXS XP4 as manufactured by Alstom Signals or approved equal and shall meet the following requirements:

a. The design and equipment furnished shall be modular in design and compatible with the types of track circuits currently used for control of adjacent or overlapping crossing warning systems within the limits of this Contract.

b. No crossing predictor system frequencies shall be selected that will preclude such track circuits as "Electrocode" "Genracode" or future 91 2/3 - 100 Hz cab signaling, unless otherwise approved by the Engineer.

c. The crossing predictor system for the automatic highway crossing warning location shall be furnished and installed as a complete redundant solid state system.

d. Crossing predictor system equipment shall have a high degree of immunity to adjacent high tension ac power lines or ac or dc propulsion systems and its operation shall not be affected by electromagnetic or inductive interference from such sources.

e. Individually housed solid state crossing predictor system shall be provided with means for connection to external circuit logic.

f. Internal circuit logic shall be so designed that a momentary shunt applied to the island circuit while the approach is occupied shall not allow the crossing warning system to cease operation (clear).

g. The crossing predictor system shall activate the AHCW devices without a delay exceeding 500 m-sec. with a train occupying any portion of the island circuit. The island circuit shall be defined by the distance between transmit and receive track connections to the rails ± 5 percent.

h. The crossing predictor system shall be capable of operating from an external 9.5 to 15.0 volt dc power source and have built-in surge protection.

i. Internal wiring of the crossing predictor system shall be wired to externally mounted pressure clamp style terminal blocks for external circuit connections.

j. The system shall include a keypad to allow access to the setup, maintenance and diagnostics purposes.

k. Visual indicators shall be located on the individual modules in easy to see locations without creating obstructions to test points or other indicators.

l. Internal logic circuitry of the receiver section of the crossing predictor system shall be designed with at least two types of security verification. This verification may be accomplished by either means of a hardware or software application.

m. The system shall be capable of operation in a temperature range of -40°F to 160°F.

n. Track ballast conditions, defective track bonds, or defective bypass shunts shall not cause unsafe warning time for the AHCW equipment.

o. The apparatus shall be equipped with LED status and fault memory lights that will be illuminated to indicate the current status of related circuits.

p. Track termination shunts, including wide or narrow band, shall be furnished in accordance with the manufacturer's standard.

q. Adjustable loss of shunt protection shall be provided.

r. The crossing predictor system shall be designed to detect forward motion of a train within the limits of the approach, calculate the speed of the approaching train and activate the warning devices at the appropriate time to ensure that a constant predetermined approach warning time will be achieved. If, after the system has activated the warning devices, the train ceases approaching or recedes from the crossing, the system shall deactivate the warning devices within a pre-determined time.

s. Multiple crossing predictor units shall be capable of operating at a different frequency on each track monitored and shall operate properly without the need of any external relays to prevent tail ring (ring-off). Tail rings, ring-by’s, and short warning times will not be acceptable.

t. The crossing predictor system shall provide a minimum warning time of 31 seconds at a minimum distributed ballast resistance of 4 ohms per 1000 feet and a minimum lumped ballast resistance of 3 ohms at the crossing for substantially constant train speeds of 4 mph up to the maximum allowable speed designated on the Contract Plans.

u. Crossing predictor system shall provide warning time shown on the Contract Plans. The means of adjustment for warning loss-of-shunt time shall be such that once set it cannot inadvertently be changed by maintenance personnel.

v. Crossing predictor systems shall, insofar as practicable, be so designed that in event of failure of any component part, a minimum of 20 seconds warning time will be provided.

w. Dummy loads to balance uneven approach lengths, or in a uni-directional application that requires the unit to be set up in a bi-directional manner, shall be furnished in accordance with the manufacturer's standard.

x. In the event of a loss of local parameters, the crossing predictor unit shall only default to the frequency assigned to that application, or to zero Hz. All other local parameters shall default to the parameters set for that application, or to the most restrictive state.

y. Where insulated joints are within the approaches of crossings controlled by crossing predictor systems, the Contractor shall design and furnish means of bypassing the insulated joints using coupling devices as recommended by the crossing predictor system manufacturer to ensure complete approach distance required for the designed warning time.

z. Lightning and surge protection shall be to the manufacturer's standard.

aa. The crossing predictor unit shall be capable of maintaining a train record log of the entire crossing approach length with joints located in the approach and remote activation being used. The internal crossing recorder shall be capable of providing the following:

   a. A printout providing detected, average, and island train speeds, and warning time for each system input referenced to the crossing island.

   b. A printout providing an accurate time stamped event logging of all system relay drive functions.

   c. The crossing predictor unit's operating program shall be field programmable.

   d. Equipment layout design shall be such as to mitigate interference from other equipment or apparatus installed within the same instrument housing.

L. SHUNT ENHANCER

1. The Contractor shall furnish a shunt enhancing equipment for installation by others as specified within Scope of Work section to improve wheel/rail electrical conductivity by providing enough potential (voltage) and energy (amperage) to electrically conduct through resistive layers of rust and other railhead contaminants.

2. Shunt enhancing equipment shall be Rail Shunt Augmenter t-Rx7100 as manufactured by Genesis Technologies or approved equal and shall have:

   a. 7.1 VDC & 6.8 Amps Output to Track

   b. 120 VAC Line or 12 VDC Battery Input Power

   c. System Diagnostic Front Panel Indicators

   d. Circuit Breaker Input Overcurrent Protection

   e. Inputs and Outputs Fully Isolated

   f. System Check Output for Monitoring System Health Status

   g. Automatic Switchover to DC Battery if 120 VAC Fails

   h. Input and Output Internal Surge Protection

   i. Plug-in Input/Output Connector - AWG 10 to 24 Solid or Stranded Wire

   j. Wall or Rack Mount Enclosed Ventilated Enclosure

M. MANUAL CONTROL BOX (CUT-OUT SWITCH)

1. The Contractor shall furnish and install a Manual Control (MC) Box, mounted on the roadway side of the instrument housing.

2. MC Box shall contain a three-position control switch for placing the operation of the crossing in Test, Normal and Override state of control. The labels “Test” on the left, “Normal” in the middle and “Override” on the right shall be installed to correspond to switch operation positions.

3. The MC Box shall be of cast iron or cast aluminum construction, complete with a hinged and gasketed door to provide a dustproof and weatherproof seal.

4. The method of mounting the MC Box on the side of the instrument housing shall provide a weatherproof seal (gasket and a silicon seal) between the back of the MC Box and the side of the SIH or Instrument Case. A pipe nipple with locknuts and bushings, or similar approved means, shall be provided between the inside of the housing and the inside rear of the MC Box to house and protect the flexible internal wiring between the housing and the terminals on the control switch within the MC Box.

5. An approved means of securing and locking the door with a standard padlock shall be provided.

6. A pocket shall be provided on the inside of the MC Box door to house the Crossing Test Record booklet.

7. The MC Box shall be fitted complete with an internal face-plate panel marked “Manual Control". The panel shall be made from one-quarter inch black micarta, satin finish. The letters shall be etched and filed with an approved white pigment.

8. A warning sign shall be placed above the switch that reads “PLACING CROSSING CONTROL SWITCH IN OVERRIDE POSITION COMPLETELY DISABLES THE CROSSING WARNING SYSTEM. NOTIFY PROPER AUTHORITY PRIOR TO OVERRIDE”.

9. The labels “Test” on the left, “Normal” in the middle and “Override” on the right shall be installed to correspond to switch operation positions.

10. The wire terminations on the switch within the MC Box shall be identified with tags, as specified. These tags shall indicate the nomenclature of the wire.

N. FOUNDATIONS

1. Precast Concrete Foundations shall be made of concrete of average compressive strength of 5000 p.s.i. and be in accordance with the applicable drawing section of Part 14 of the AREMA Signal Manual for the type of precast foundation required. Precast concrete foundations shall be steel reinforced. Reinforcing steel shall be placed not less than one inch from any outside surface.

2. Bolts, Nuts, and Hardware

    a. Bolts, nuts, and washers shall be galvanized. Nuts and threads shall be in accordance with AREMA Specifications for Bolts, Nuts and Threads, Signal Manual, Part 14.6.20.

   b. Plain washers shall be in accordance with AREMA Specifications for Plain and Spring Lock Washers, Signal Manual, Part 14.6.21. Steel shall be in accordance with AREMA Specifications for Various Types of Steel, Signal Manual, Part 15.1.4, Section 1.

3. Finish and Curing of Precast Foundations - Proper control of the water-cement ratio, high frequency vibration and controlled curing shall be used. An air entraining agent shall be used to increase the resistance to weathering. All outside surfaces shall present a smooth and finished appearance.

O. MISCELLANEOUS PRODUCTS AND COMPONENTS

1. Signal Terminal Connectors

   a. Signal system terminal connectors shall be in accordance with the applicable requirements of AREMA Signal Manual Part 14.1.15.

2. Signal Terminal Binding Posts

   a. AHCW system terminal board binding posts, required for supervisory control circuits, shall be in accordance with AREMA Signal Manual Part 14.1.10.

3. Terminal Post Insulators

   a. All terminal posts, located on terminal boards in the SIH or Instrument Case used to terminate 55, or greater, ac or dc volt circuits shall be provided with a protective insulator.

   b. The type of insulator shall be individual for each terminal post and shall be fire-resistant.

   c. Insulated test links shall be Type 0255-101 as manufactured by Western-Cullen-Hayes, Inc. or approved equal.

4. Lightning Arresters and Equalizers

   a. Lightning arresters and equalizers shall be mounted on three post porcelain or approved type base and shall be in accordance with AREMA Signal Manual Part 14.1.7.

5. Terminals for Wires and Cables

   a. All solderless terminals shall be in accordance with AREMA Signal Manual Part 14.1.1, or as specified herein.

   b. Terminals shall be of the solder-less crimp-on type. Samples of all solderless terminals shall be submitted for approval.

   c. All stranded copper wire shall be fitted with an approved type of terminal at all points where the wires are to be terminated on terminal binding posts.

   d. The terminating means shall be of five types:

1) a lug for terminating heavy wires or signal power wires;

2) a solder-less insulated terminal as manufactured by AMP, Inc. under the trade name of “Ring Tongue Plasti-Bond,” similar to Catalog No. 35628, or approved equal, for terminating No. 16 and No. 14 AWG stranded wires;

3) a solderless insulated terminal similar to AMP Catalog No. 35627, or approved equal, for terminating insulated wires Nos. 12-10;

4) a solderless insulated terminal similar to AMP Catalog No. 324108 for terminating other stranded vital circuit insulated wires Nos. 20-16 AWG having a maximum diameter of 0.200 inches;

5) a solderless insulated terminal, AMP Catalog No. 320554, or approved equal, shall be furnished for No. 8 studs and AMP Catalog No. 320571 or approved equal, shall be furnished for 1/4 inch studs for non-vital circuit insulated stranded wires Nos. 22-16 AWG having a maximum diameter of 0.125 inches.

e. Where flag-type terminals are required, they shall be similar to AMP Catalog No. 322313, or approved equal, for terminating No. 16 and No. 14 AWG stranded wires. Other pre-insulated terminals shall be similar to those shown in AMP Product Bulletin No. 109-1.

f. The terminals shall be for attaching to the ends of the conductor in such a manner that the flexibility of the conductor will not be destroyed and the possibility of breakage at the terminal will be reduced to a minimum.

g. Terminals shall be for attaching to the wire with a tool made by the manufacturer of the terminal and recommended by the manufacturer for the terminals being furnished.

h. The tool shall be equipped with a ratchet device to ensure proper indentation of the terminal and which will not release until proper indentation is complete.

6. Tagging for Cables, Wire, and Equipment

a. Except as otherwise specified in this Section, both ends of each cable and each cable wire and all single wires that terminate in the cases, junction boxes, gate mechanisms, instrument housings on entrance racks, and any equipment of the AHCW system outside of such locations shall be permanently identified with a tag. Tags shall not obscure connecting links used between terminal binding posts. Tags shall be installed so that they may be read with a minimum of disturbance of the tags and wiring. Each conductor of the cable shall be rung out and identified before applying the tag.

b. Tags for wire and cable identification and for identification of transformers, resistors, reactors, and other components shall meet the following requirements and shall be subject to the approval of the Engineer:

1) Sleeve Type Tags

a) Tags for identification of individual cable conductors and field-installed wires within instrument housings, base of signal junction boxes, and similar applications shall be the sleeve type as manufactured by Raychem Corporation, Thermo-fit Marker System (TMS), W. H. Brady Co., Brady-sleeve (XB-321, -322, -323), or approved equal. The application of the conductor nomenclature shall be in accordance with the manufacturer's instructions and shall result in a permanently bonded and legible identification.

2) Flat Plastic Tags

a) Tags for identification of vital relay plug boards, individual transformers, resistors, reactors, terminals, and other miscellaneous components within the cases or SIH shall be the flat plastic laminated type.

b) These tags shall be 1½ inches long by 3/4 inch wide with one, 5/16 inch hold located in the center of the width. The distance from the edge of the tag to the hole shall be approximately 9/32 of an inch. The untreated tag shall be milk white "vinylite," or approved equal.

c) The identifying nomenclature space shall allow for three rows of lettering, and the tag material shall be capable of receiving typed-on characters by conventional means. The height of the lettering shall be not less than 1/8 inch.

d) After lettering, both the face and back side of the tag shall be covered with a clear plastic coating, "vinylite," or approved equal, of at least 0.01 of an inch thick.

e) The nomenclature applied to tags to go on entrance racks and boards shall show the terminal post identification on the top line. The functional nomenclature shall appear on the bottom line, or, if required, on the middle and bottom lines. The terminal posts shall be identified by geometry coordinates, such as rack, row, and post number.

3) Wrap Around Tags

a) Tags for identification of the individual wires of plug-in relays, within the SIH or Instrument Case and the wayside cases, shall be the wrap around, self-adhesive type.

4) Flag Marker Tags

a) Tags for identification of individual wires of shelf-mounted relays, and wires and conductors in junction boxes, shall be flag marker tags of the miniature locking type.

5) Pressure-Sensitive Labels

a) The rows and columns on entrance racks shall be identified by pressure-sensitive labels bearing the geometric coordinates.

b) Wires on plug-in vital relays shall be identified by the contact to which they are applied. These tags shall be wrap-around self-adhesive type.

7. Hardware

a. All mounting hardware exposed to the elements and used for signal equipment, cases, conduit, hangers, brackets, clamps, etc., shall be hot-dip galvanized, except as otherwise approved by the Engineer.

1) Galvanizing

a) The hot dip process of galvanizing shall be used. All parts shall be pickled so that all scale and adhering impurities will be removed. The zinc coating shall be of commercially pure zinc and shall be continuous and thorough. It shall not scale or blister or be removable by any of the processes of handling or installation. The finished surface shall be free from fine line cracks, holes, or other indications of faulty galvanizing. It shall be smooth and free from adhering flux and other impurities. The edges and ends of parts shall be free from lumps and globules. Parts shall be coated with at least 2 ounces of zinc per square foot of galvanized surface, after all bending, cutting, drilling, and final fabrication.

b) In order to avoid destruction of resilience encountered in the hot dip process of galvanizing, all lock-washers shall be cadmium plated.

c) All galvanized mounting hardware nicked during construction shall be painted aluminum and coated when dry with a non-oxide grease to prevent corrosion.

2) Cadmium Plating.

a) All nuts, bolts, and washers used for the mounting of equipment within finished enclosures shall be cadmium plated or stainless steel. As an alternate, the Contractor may submit another type of plating or non-corroding metal for the Engineer's approval.

b) Cadmium plating shall be an impervious, dense, hard, fine grained, continuous, closely adhering coating of commercially pure cadmium, free from capillaries and shall completely cover the surface of the part in a smooth, bright layer. Plating on raised or prominent portions shall show no evidence of blackness or loose crystalline structure. It shall have a minimum thickness of 0.0006 of an inch and shall withstand the salt spray test for at least 1,000 hours or an equivalent test approved by the Engineer.

8. Padlocks and Keys

a. Signal padlocks and keys shall be furnished and installed for all housing or case doors and covers of signal equipment installed under this Contract. Switch padlocks shall be furnished and installed for manual control boxes requiring access by train crews. The Contractor shall obtain from the Railroad the proper ordering references for the Railroad's signal and switch padlocks.

9. Sealing Compound

    a. Sealing compound for use in sealing cable entrances shall be in accordance with AREMA Signal Manual Part 15.2.15.

10. Cable Entrance Pipes

    a. Cable entrance pipes for ground-mounted AHCW instrument housing shall be 6 inch schedule 40 PVC pipe, 3 feet long with bell housing on one end, unless otherwise approved by the Engineer.

11. Paint and Finish

    a. All paint and painting procedures shall be in accordance with applicable requirements given in AREMA Signal Manual Part 1.5.10 where the AREMA requirements do not conflict with any requirements of the specifications.

12. Ground Rods, Welds, and Wire

    a. Ground rods shall be copper-clad steel, of the non-rusting type, as manufactured by Copperweld Corporation or approved equal. The rod shall be at least 10 feet in length and at least 5/8 inch diameter.

    b. All ground wire connections to ground rods shall be of exothermic weld type as manufactured by Erico Corporation or approved equal. No mechanical connections are permitted.

    c. Internal ground wire from the equipment to the ground bus shall be insulated No. 6 or 10 AWG stranded copper wire. Insulated ground wire shall be colored green.

    d. A grounding bus of nickel-plated hard-drawn pure copper shall be provided in each crossing case. The minimum dimensions of the bus shall be 8 inches by 8 inches by 1/2 inch thick. A minimum of twelve 3/8 inch holes shall be drilled and taped in the bus and twelve (12), 3/8 inch by 1/2 inch long hex head nickel plated bronze studs with one washer each shall be installed.

13. Signal Transformers

    a. Signal transformers shall be in accordance with the latest revision of AREMA Signal Manual Part 14.2.10 for single-phase transformers, where the requirements do not conflict with any requirements specified in this Section.

        1) General Signal Transformers

            a) General signal transformers shall be provided with sufficient primary and secondary voltage taps to adjust between 85 and 110 percent for varying feeder voltages. All transformers shall be rated to carry 125 percent of the total load continuously.

b) The primary and secondary taps shall be brought to terminals mounted inside the transformer case, and a connection for each secondary tap and at least two connections for the primary winding shall be brought out of the transformer to AREMA terminals, or other approved bushings and terminals. All terminals shall be identified.

2) Signal Lighting Transformers

a) Signal lighting transformers shall be equipped with taps to provide output voltage adjustment in one volt steps, from 6 to 15 volts. The primary excitation voltage shall be 120 volts ac at 60 Hz.

P. CONDUIT

1. Contractor shall install one (1) four-inch (4”) Schedule 80 PVC conduit parallel with the track and one (1) four inch (4”) galvanized rigid steel (GRS) conduit perpendicular to the track at each at-grade crossing location for signal cables use per the Contract Plans and Technical Specifications, or as directed by MassDOT/MCRR. PVC conduit shall be ten (10) feet from the edge of the roadway on both sides and parallel to the track and the GRS conduit shall be located ten (10) feet off the crossing surface edge and perpendicular with the track and or as directed by the Engineer. A two feet minimum distance between roadway and track conduits shall be provided to accommodate bending radius of cables. A minimum of three feet of cable shall be looped at cable transition between conduits.

2. Contractor shall submit proposed end of conduit location finders, i.e. stakes, ribbons, etc., for review and approval. Contractor shall mark ends of the conduit with approved marking devices.

a. Rigid

1) Rigid conduit shall be used at locations as specified herein and as shown on the Contract Drawings, specifically steel conduits shall be used for cable installation under tracks. The types of rigid conduit to be used for the various applications shall be as follows:

a) Steel conduit shall be made of the best grade standard weight steel pipe protected inside and outside by a coat of hot dip galvanizing. Where elbows are used, they shall be long radius type. Steel conduits shall be protected in shipping and handling by approved thread protectors.

b) Contractor shall size conduit in accordance with Massachusetts Electric Code (MEC). Submit fill calculations utilizing one or more trade size 4" conduits for review by the Engineer.

b. Schedule 80 PVC

1) Schedule 80 PVC conduit shall be used at locations as specified herein and as shown on the Contract Drawings, specifically PVC conduit shall be used for cable installations under the roadway. The types of PVC conduit to be used for the various applications shall be as follows:

a) Four inch diameter, thick-wall polyvinyl-chloride conduit, High Impact Schedule 80, herein referred to as PVC conduit.

b) The top of conduits placed under existing grade or paving other than track shall generally be 30 inches minimum below top of final grade.

c. Flexible Conduit and Hose

1) Hose for track circuit leads installation shall be Valuflex/GS as manufactured by HBD Thermoid Inc. and shall be made of multiple plies of rubber spiral polyester fiber and EPDM tube or approved equal.

2) Metallic Flexible Conduit. Where the Engineer permits, the use of metallic flexible conduit shall be Type UA or approved equal.

d. Fittings

1) Approved PVC fittings shall be used for PVC conduit. All fittings for rigid steel conduit shall be of cast malleable iron and shall be protected by hot-dip galvanizing.

2) Expansion joints for PVC conduit, if required, shall be Engineer-approved.

Q. BATTERY TRAYS

1. The Contractor shall furnish wood battery trays for installing batteries inside battery well or signal instrument case in accordance with Contract Documents in accordance with batteries proposed by the Contractor. Alternative designs of polyethylene may be submitted for consideration.

R. BATTERY WELL

1. Battery Well as manufactured by Dixie Precast or approved equal, shall be provided complete terminal board, cover, chain and padlock at the locations where existing instrument housing does not have sufficient space to accommodate new battery banks to be provided by the Contractor. The battery well dimensions and cable to the instrument housing shall be sized by the Contractor.

S. BATTERY CHARGING EQUIPMENT

1. Design Requirements

a. Two battery banks and charging equipment shall be provided. One bank shall be used for crossing control circuits and another bank shall be used for wayside signal equipment. A separate battery bank shall be used for electronic track circuits if required.

b. Battery charging equipment shall be a microprocessor-based design for continuous operation, shall provide constant current and constant voltage charge and shall meet the requirements of AREMA Signal Manual, Part 9.2.5.

c. Battery charging equipment shall be designed to deliver rated outputs with an input voltage of 100 to 130 volts ac at 60 Hz, single phase, two-wire input.

d. Battery charging equipment shall have a reserve capacity at least 25 percent above the calculated requirements.

e. Each charger shall be provided with an adjustment device to change the rate of output current.

f. Terminal markings for ac and dc terminals shall be permanent.

2. Track Battery Chargers.

a. Track battery chargers shall provide constant current and constant voltage charge and shall meet the requirements of AREMA Signal Manual, Part 9.2.5. Chargers shall have a selectable float voltage to match supplied battery manufacturers requirements, as manufactured by National Railway Supply ERBC 5/5, or approved equal.

3. Battery Bank Chargers

a. Battery bank chargers shall be fully adjustable rectifiers as manufactured by Cragg Type ETC, National Railway Supply Type ERBC, LaMarche Type A75 or approved equal.

b. The Contractor shall furnish battery bank chargers for operating all equipment required to operate the connected equipment.

c. The charger shall provide a stabilized output voltage, with output current limiting. The capacity of the battery charger shall be determined by the Contractor and approved by the Engineer. The charger shall adjust its output current automatically according to the load and to the demand on the battery.

T. STORAGE BATTERIES

1. The Contractor shall furnish storage batteries for all applications except as otherwise approved by the Engineer.

a. Batteries shall be maintenance-free, sealed railroad signal batteries, designed for railroad use as a standby source of power for highway crossing warning devices, signal control systems, and other similar uses as manufactured by EnerSys PowerSafe DDr 50 or approved equal.

b. Battery must operate, with a high degree of reliability, -40ºF to +160ºF in a harsh environment, enclosed only in a relay house or raised concrete battery box.

c. The battery shall not be capable of explosion under any condition, including a short circuit discharge.

d. Batteries shall meet the requirements of AREMA Signal Manual Part 9.1.3, where the requirements of the Signal Manual do not conflict with any requirements specified in this Section.

e. Battery Size and Application

  1) The following is a guide to minimum storage battery size. The Contractor shall calculate the loads based upon the equipment that the Contractor proposes to furnish. All batteries shall be sized for a minimum 24-hour standby capacity at an ambient temperature of 40°F.

    a) 80 AMP-Hour (minimum) - DC steady energy track circuit battery;

    b) 300 AMP-Hour (minimum) - B14 battery for wayside equipment;

    c) 400 AMP-Hour (minimum) - Local B12 battery.

f. Physical Construction:

  1) Polypropylene container and cover.

  2) Projected design life of 20 years at 80 percent rated capacity.

  3) Individual cells (multiple cell groups or modules not allowed).

U. SIGNAL CABLES

1. General

  a. Vital signal cable furnished for this Contract shall meet AREMA C&S Manual Part 10.3.17, Recommended Design Criteria for Signal Cable, Armored and shall be of the highest quality, assuring durability for minimum life expectancy of 40 years. These cables shall be suitable for use in the environment to be encountered on a railroad signal system and shall be certified for continuous operation at 75°C in wet or dry locations with no conductor failing in continuity or with loss of insulation to cross or ground less than one meg-ohm.

  b. Actual conductor size shall be calculated to suit distances and loads. Detail conductor sizes and cable makeup for application of Contractor's final design. Submit voltage drop calculations and size conductors to provide minimum voltages specified in the AREMA Communications & Signal Manual of Recommended Practices 3.2.15 (gates), 3.2.35 (flasher assemblies), and, as applicable, 3.2.60 (mechanical bell) or 3.2.61 (electronic bell) under maximum calculated load conditions. Sizing for conductors in remaining circuits shall allow no more than a five percent voltage drop between power source and load under maximum calculated load conditions.

  c. Multi-conductor distribution cable containing more than two conductors shall contain a minimum of 10 percent spare conductors or two spare conductors, whichever is greater, except that two conductor cables will not require spare conductors.

2. Pre-qualification.

   a. All cable manufacturers supplying cable for this Contract must be pre-qualified by the Engineer. The Contractor shall provide all of the data required for the Engineer's evaluation and shall make the arrangements for any required demonstrations and tests.

   b. Qualifications shall be based on the following criteria:

      1) Past Performance and Experience. The cable manufacturer(s) must demonstrate previous successful experience in supplying cable to the railway industry for use as vital signal control cables. A list of such installations shall be provided for each cable manufacturer to be considered.

      2) Quality Assurance Program. The manufacturer of cables in accordance with the requirements of this specification shall be accomplished in compliance with a Quality Assurance Program that meets the intent of the ASQC Standard CI-1985; General Requirements for a Quality Program. Such compliance shall promote a thoroughly tested cable which will render the 40 year service life to the user. Prime concern must be focused on the necessary formal assurance requirements to ensure that cable failure cannot be attributed to actions or lack of actions by the manufacturer.

      3) Technical Data. The Contractor shall provide full technical data which demonstrates compliance with the requirements of this specification for each specified cable type the Contractor plans to supply.

      4) The manufacturer shall certify compliance with the following warranty prior to selection:

         a) The manufacturer warrants that the design, material, and workmanship incorporated in each item of cable shall be of the highest grade and consistent with the established and generally accepted standards for aerial and underground cable for vital railroad signal, communication, and power circuits; and that each such item and every part and component thereof shall comply with this specification.

         b) The manufacturer agrees that this warranty shall commence with the acceptance of each item of the cable, whether the defect is patent or latent, and shall continue for a period of two years after initial satisfactory operation of the item or four years after acceptance of the item, whichever is shorter.

         c) The warranty covering any length of cable that shall be replaced by the manufacturer under the above conditions shall be reinstated for a period of two years, effective as of the day when said replacement is affected. If the failure is found to be of major importance and affects any other item of cable, the reinstatement of the warranty shall then be extended to cover the item so affected as well and shall start as of the date of such replacement. The warranty reinstatement provided herein shall apply only to the first replacement or repair of any such item and, in the case of failure of major importance, to the first extension of the said warranty to said affected items.

d) The foregoing warranties are exclusive and in lieu of all other warranties, written, oral, implied, or statutory (except as to title and freedom from lien). In no event shall the manufacturer be liable by reason of breach of warranty for special or consequential damages.

3. Quality Assurance.

    a. The Contractor shall submit the following to the Engineer for approval prior to shipment of the cable:

        1) List of the cable manufacturer’s railway signal installations.

        2) Each cable manufacturer’s Quality Assurance Program.

        3) Full technical data for each type of cable which the cable manufacturer intends to supply.

        4) The Contractor shall submit two certified copies of the following to the Engineer for approval:

            a) Cable test reports for all factory tests.

            b) Test reports of cable tests conducted in the field in accordance with the approved testing procedures.

            c) Certification that each cable supplied complies with the requirements of these specifications.

            d) Information to be supplied by certified cable test reports shall include the following:

                1. Report Number.

                2. Date and location of test.

                3. Description of test and test conditions.

                4. Complete cable or wire description.

                5. Lot, batch, or reel identification number.

                6. Quantitative test results.

                7. Summary of test results.

                8. Information on the components of the cable tested, to include batch numbers and physical and electrical properties.

4. Trench Marker Tape.

a. The Contractor shall furnish trench marker tape for signal cable: bright red, six (6) inches wide, and continuously coded in black lettering with the following legend:

CAUTION CAUTION CAUTION

BURIED SIGNAL CABLE

5. Site Test Equipment and Materials.

   a. All test instruments and equipment necessary to conduct the tests specified herein shall be available and ready-for-use not less than 48 hours in advance of test need. Ready-for-use shall mean properly matched for test parameters, properly calibrated, and supplied with leads, probes, adapters, stands, etc. necessary to conduct a particular test in accordance with FRA requirements.

   b. All temporary or interim test related materials, special tools, connections, jumpers, etc. shall be furnished and available in advance of the test.

V. WAYSIDE INSTRUMENT CASE

1. The Contractor shall design, furnish, install, test and placed in service a complete factory-wired railroad type signal instrument case complete with all equipment necessary to provide train detection and control of AHCW equipment. Instrument housing shall include, but not limited to the following equipment:

   - Utility power equipment.
   - Meter enclosure on the side of the housing.
   - Motion-based train detection and AHCW control equipment.
   - Two (2) battery banks.
   - Two (2) battery chargers.
   - Power off indication LED light on each side of case.
   - Manual Control Box (test and cut-out switch)
   - Fan with thermostat mounted to the case side
   - All other equipment and facilities required for safe and reliable operation of AHCW system.

2. The case shall be as manufactured by PTMW or approved equal. The Contractor shall submit the following to the Engineer for approval:

   a. Shop drawings showing components, layout and construction of wayside cases.

   b. Site specific installation layouts, mounting and grounding arrangement of each case.

   c. Factory and Field Inspection Procedure.

3. The case design shall prevent air penetration and shall be equipped with front and back doors. Doors shall be provided with handle and a three-point locking device to ensure that the door

cannot be locked until it is completely closed. Provisions shall be made for locking with an approved standard hex keyed padlock.

4. Doors shall be provided with means for being secured in the 90-degree open position.

5. Each door shall be equipped with a plan holder of sufficient size to hold all record plans for the location.

6. The hinges for both doors shall be on the same side of the housing and shall be so designed that when the door is closed and locked, wear due to vibration shall be prevented. Hinges shall be separate castings, securely fastened to the housing and door. The hinges shall be equipped with bronze hinge pins, and fittings to allow lubrication. The manufacturer shall lubricate the hinges before the case is shipped.

7. Instrument case provided under this Contract shall be furnished complete with concrete foundations, terminal board, power off LED lights, battery trays, cable entrance pipes, power equipment, grounding equipment and all miscellaneous parts and material required to provide a fully functional instrument case to control a grade crossing warning equipment.

8. The Contractor shall inspect wayside case after shipment prior to installation for defects and damage and after installation. Any deficiency found shall be reported to the Engineer. The Contractor is responsible for replacing of any material or equipment that is damaged, lost, or stolen during the transport and installation of the wayside cases at no additional cost to the Contact.

9. Wayside case shall be of 12-gauge sheet steel construction with a steel floor. The top and sides of the case shall be lined with five resistant insulating materials complying with a flame spread of 0-20 and a fire rating of 7 in accordance with ASTM-E-84. Each wayside case shall have knockout(s) for both aerial and underground cable entrance and shall be provided with fire-resistant ventilated openings in each side, lined with heat and cold insulating material and constructed to prevent sweating.

10. The Contractor shall submit for approval design, materials and proposed methods of instrument case installation, including proposed equipment layout.

11. Wayside case shall be provided with a convenience outlet, switched porcelain base lamp holders, and 60 watts equivalent LED lights rated at 120 VAC located on both track and field sides. Convenience Outlet (Receptacles) shall be provided with a Ground Fault Circuit Interrupter (GFCI).

12. A three-eighths inch high tensile strength, silicon manganese bronze stud bolt for externally grounding the case shall be provided. Perforations of sheet steel cases will not be permitted.

13. The exterior of the signal instrument house shall be painted in accordance with requirements of AREMA C&S MANUAL PART 1.5.10. The finish color shall be as directed by the Engineer. The bottom of the signal instrument house shall be treated with a corrosion resistant undercoating. All paint shall be fire retardant.

14. Each case shall be mounted on foundations level and plumb and fastened with the hardware provided. Trackside doors in the open position shall clear center line of the nearest running track by 8'-6" minimum and top of foundation level with top of rail unless otherwise approved by the Engineer.

15. All grounding material shall be provided and submitted for approval.

16. Pipes for underground cable entrances shall be installed in the knockout holes provided in the rear of each case. These pipes shall be secured to each case by locknuts and insulating bushings.

17. Cables entering the instrument case shall be dressed, pot headed, tagged, and terminated. All cable entrance pipes shall be sealed with approved sealing compound.

18. AC Power Supply:

    a. The Contractor shall design and furnish a new metered power service to the Signal Instrument Case. The new service will be located on a new pole adjacent to the crossing instrument case. The Contractor shall obtain all permits, licenses and agreements with the supplying Utility Company and is responsible for all coordination.

    b. Peak load calculation for meter service shall be provided by the Contractor. Actual power conductor size shall be calculated to suit distances and loads. Sizing for conductors shall allow no more than a five percent voltage drop between power source and load under maximum calculated load conditions.

    c. All power service materials and equipment installed shall conform to all applicable state and local ordinances pertaining to electrical power installations and the latest edition of the MEC.

    d. The Contractor shall provide and install cable for connection of the 120VAC, three wire feed from the meter to the utility tapping point. A sufficient cable slack shall be provided for the use by Utility Company. The meter and connections to the power line shall be provided by Utility company. Coordinate with the Power Company for any additional requirements.

19. Relay and Component Mounting

    a. Relay Plug-boards shall be designed for insertion of removable type contacts. The method of attaching the wires to the removable contacts shall be solderless connections. Unless otherwise approved by the Engineer, or proven by type acceptance testing, the plug-board shall be designed so that the removable contact will have a direct connection with the contact and coil prongs.

    b. The plug-boards shall be in accordance with the applicable Sections of AREMA Signal Manual Part 6.2.2. All wires shall be of sufficient length to permit them to be moved to any contact on the same relay. The plug-boards for vital relays shall be equipped with a registration plate to prevent relays of the wrong type, contact arrangement, or operating characteristics from being inserted.

20. Identification

    a. There shall be an identifying nameplate for each relay, or other instrument mounted in the case.

    b. The relay plug-boards shall be equipped with a tag as specified herein. This tag shall indicate the nomenclature of the relay.

    c. The contact numbering system shall be uniform for each type of relay used.

    d. The wiring to each removable contact shall be identified with a wraparound tag as specified herein. This tag shall indicate the relay contact number assigned to the wire.

    e. Wire and cable conductor identification tags for terminal board mounting shall be as specified herein.

    f. External identification of the MCS shall be provided.

    g. Provisions shall be made to locate spare wire conductors on dedicated terminal posts or lightning arresters, in line with the working conductors of any one cable.

    h. Wire-wound resistors shall be spaced with 1/2 inch minimum clearance between adjacent resistors.

21. Cable Entrance Pipes

    a. Cable entrance pipes shall be provided.

22. Grounding

    a. A 3/8 inch high tensile strength, silicon manganese bronze stud bolt for externally grounding the case shall be provided. Perforations of the case will not be permitted.

    b. Internal ground bus arrangement shall be as specified herein.

23. Wiring

    a. Internal wiring for vital circuits shall be in accordance with applicable AREMA Signal Manual Parts, unless otherwise specified herein. No. 16 AWG 19 strand flexible wire shall be used for all circuits, except for No. 10 AWG, or larger, flexible stranded shall be used for signal lighting, track connections to the main terminal board and battery and rectifier bus circuits. Solderless terminals, for stranded wire, shall be in accordance with these specifications. Wiring for lights, switch and convenience outlets shall be insulated No. 12 AWG, flexible, THHN wire installed in EMT. Solid terminal connectors shall be used for all short terminal jumpers.

24. Wiring Raceway

a. All internal case wiring shall be contained within surface mounted plastic raceway. Raceway shall be of a polycarbonate, low smoke type with a solid snap-on cover and flexible side walls. The side walls shall be of “finger” type construction allowing for insertion and removal of wire runs with terminations attached. Sizes shall be determined by the manufacturer. Fill capacity shall not exceed 40%.

EXECUTION

A. SITE CONDITIONS

1. MassDOT believes that information on the Plans or any available Railroad Plans are correct insofar as it is shown; however, it does not guarantee or represent that the existing railroad facilities conform to the drawings and Plan(s). It shall be understood that conditions may exist which are contrary to the conditions indicated by the existing plans and that the Contractor assumes all risks regarding the cost or quantity of the work to be done because of any use which the Contractor may make of them. The Bidder may visit the site and satisfy them self by visual inspection alone, as to existing conditions. No claim for extra cost will be allowed by MassDOT because of the Contractor’s unfamiliarity with observable site conditions.

2. The Contractor shall properly notify “Dig Safe” at 1-888-344-7233 prior to any excavation or subsurface work.

3. The Contractor shall contact the Railroad in order to obtain written permission to enter the right-of-way to work on signals at the crossing. The Contractor shall coordinate times when crossing will be taken out of service for proposed work.

4. All work shall be accomplished in a manner that will protect the crossing throughout the prosecution of work.

B. EXCAVATION AND BACKFILL

1. General**.** It is the responsibility of the Contractor to obtain from the utility companies and others the location of all underground facilities prior to beginning any excavation. Any damage to an existing facility shall be repaired by the Contractor at the Contractor’s expense.

   a. Unless otherwise indicated in the Plans or in the special provisions, the Contractor shall perform all excavation, backfilling, and resurfacing work, including removal and replacement of curbs, sidewalks, paved surfaces, and any other materials necessary to complete the work in accordance with the Plans and specifications or as ordered by the Engineer

   b. In making excavations in paved surfaces, such as for the installation of signal conduit, cuts shall be made with a concrete saw to a minimum depth of 2 inches along the neat lines of the area to be removed.

   c. All landscaping and underground utility systems that have been disturbed by the construction shall be restored to their original condition by the Contractor at the Contractor’s expense upon completion of the work.

2. Excavation for Conduit and Buried Cable
    a. Trenches necessary for placing conduit and buried cable shall be excavated at the location shown on the Plans or as directed by the Engineer, and the bottom of conduit trench graded to a pitch of not less than 3 inches per 100 feet.

3. Excavation for Foundations
    a. Excavation for foundations shall be made at the locations shown on the Plans or as directed by the Engineer.

4. Backfill
    a. Backfill of suitable material shall be placed and compacted as directed by the Engineer. The fill material around cables shall be free of sharp objects that might damage cable. Excess materials shall be disposed of in a manner satisfactory to the Engineer.
    b. All buried cable shall be marked with 6-inch red, plastic marking tape in the backfill, 12 inches below finished grade.

C. INSTALLATION

1. General
    a. AHCW wayside equipment shall be installed in accordance with the approved installation plans, recommendations of regulatory agencies specified herein or as directed by the Engineer.
    b. AHCW control system equipment shall be mounted in such a manner as to provide for easy access to test points, indicators, and adjustments.
    c. Track circuits termination diodes and shunts shall be installed in accordance with the manufacturer’s standard and at locations shown on the approved plans.

2. Foundations and Cribbing
    a. At all locations where pre-cast concrete foundations are installed, a crushed stone base shall be placed and compacted on the accepted subgrade to a total depth of not less than 4 inches after compaction.
    b. When placing foundations, the Contractor shall exercise care to ensure that anchor bolts are not bent, or threads damaged. All anchor bolt threads, washers, and nuts shall be protected by applying friction tape, or other approved method satisfactory to the Engineer, until such time as the unit to be supported is installed. Anchor bolts requiring leveling nuts shall be of sufficient length.
    c. Foundations and pads shall be installed level and plumb.
    d. If the surfaces of all foundations exposed to view do not present a uniformly clean surface of even texture and appearance, the surface shall be treated and rubbed to obtain a satisfactory finish, subject to approval by the Engineer.

e. After backfilling foundations, the Contractor shall ensure that the foundation is plumb and level. Top of flasher and gate layout foundation to be at the same elevation as the crown of the roadway and no more than 4 inches above the final top of grade.

f. If a crib support wall is required, the top of final grade in relation to the top of foundation shall be as approved by the Engineer.

g. Each tier of timber cribbing shall be drift bolted to the one upon which it rests with 3/4 inch galvanized drift bolts in sufficient length to extend through two tiers and not less than 4 inches into the third tier. Concrete or steel cribbing shall be installed in accordance with the manufacturer’s instructions.

h. The filling of the interior of the crib shall follow closely the erection of the successive tiers and at no time shall the cribbing be laid up higher than 3 feet above the backfilled portion.

i. The cribbing shall be installed to have a minimum of 6 feet perimeter walkway around the case or signal.

3. Flashing Light Signal Installation

a. The flashing light signal mast shall be securely fastened within the split base in a manner such as the distance between the split halves of the base shall be equal. The heads of the bolts in the base assembly shall be squared with each other and facing oncoming highway traffic.

b. The base shall be securely fastened to the concrete foundation with the hardware provided for that purpose. The mast shall be plumb when the base assembly is fastened to the foundation. Shims, spacers, or other filler devices shall not be used to level and plumb flashing light signal equipment.

c. A hole shall be factory-drilled in the mast for the bottom cross-arm. The center line of the hole shall be located so that, when the cross-arm with light units is attached thereto, the lowest part of the light assembly shall be between 7’-6” and 9’-6” above the crown of the roadway. Holes for additional cross-arms, when required, shall be located and drilled in the field after the bottom cross-arm has been secured to the mast. The centerline of the additional light units shall be 23 inches above the centerline of the lower light unit.

d. Electronic bell(s) shall be installed on the top of the mast of the flashing light unit as shown on the Contract Drawings.

e. Underground cables shall be installed within the mast and terminated in the base junction box. No.10 wire shall be run to the cross-arm junction box in a manner as specified in AREMA Signal Manual Part 10.4.1.

1) Wiring for the flashing light units and the bell shall be 37 strand, No. 10 AWG in accordance with the requirements of the AREMA Signal Manual.

2) Where additional light units are used, wiring for these units shall multiple off the wiring in the next lowest cross-arm junction box.

3) Wiring for bells shall go directly from the bottom cross-arm junction box to the bell.

4) Terminations for flasher unit and bell wiring shall be solderless compression type terminals as specified herein.

f. With ac power off and standby battery in a fully charged condition, the lamp voltage shall be adjusted to 9½ volts for LED lights (measured at the lamp) by varying the resistor for the flasher unit.

g. The front lights of the flashing light unit shall be focused to provide maximum visibility for oncoming highway traffic. The back lights of the flashing light unit shall be focused to provide close visibility for oncoming highway traffic from the opposite direction.

4. Cable Installation

a. General

1) The installation of wire and cable shall conform to Parts 10.4.1 of the AREMA Signal Manual, except as modified herein.

2) Prior to the installation of underground cables, a sand bed compacted to a depth of not less than 3 inches shall be placed on the accepted subgrade. Following the installation of the cables, sand backfill shall be placed and compacted with hand tools around and over the cables in 4 to 6 inch layers, to a uniform depth not less than 8 inches without damage to the cables.

3) The Contractor shall provide sufficient slack in cable conductors at all terminating posts to enable three re-terminations of the conductor due to broken eyelets without re-servicing or re-potheading the cable.

4) Cables shall not be bent to a radius less than 10 times the diameter of the cable during installation, or as finally installed.

5) All cable runs shall be continuous without splices between cable terminating locations.

6) Tags to identify cables shall be of plastic material. Tags shall be lettered to correspond with the cable destination and number of conductors in the cable. The type of tag to be used shall be as described in these specifications.

7) All cables shall be terminated in conductor order. Individual cable conductors shall be identified at each cable termination with plastic tags as specified herein. All spare conductors in each cable shall be terminated and identified.

8) All cable entrance openings in equipment enclosures and junction boxes shall be sealed with a pliable sealing compound after the cable is in place. Sealing compound shall be used to seal the area around cable where the cable emerges from the end of a conduit, pipe, or duct bank. All spare conduits shall be sealed or plugged in an approved manner.

9) A suitable lubricating medium, non-injurious to the cable insulation, shall be used when pulling cables into conduit or pipe.

10) Wherever multiple conductor cables are terminated, the outer sheath of the cable shall be carefully removed to the point of cable entrance. At the end of the cable sheath or covering, two layers of plastic electrical tape shall be applied.

11) When direct buried parallel the tracks, cable shall be buried a minimum depth of 30 inches below finished earth or ballast. Cable shall be laid loosely in the trench with a sand bed and backfill as specified. When passing under tracks, cable that is not protected in conduit shall be buried a minimum depth of 48 inches below top of tie.

12) Upon request, and only under extreme circumstances and because of installation hardship, will installation of a cable be allowed to a depth of less than 30 inches, subject to the Engineer's approval. The cable shall be protected in a manner as approved by the Engineer.

13) Restoration of backfill and ballast shall be subject to the approval of the Engineer.

14) Whenever any signal cable is to pass under roadway or tracks, if existing conduit is not provided, the cable shall be installed in a 4-inch galvanized steel conduit and the conduit shall extend 20 feet beyond the edges of the pavement. It shall be the Contractor's responsibility to restore the pavement or roadway to its original condition, subject to the approval of the Engineer.

15) Where cable leaves the ground at other than buildings or in foundations, it shall be protected by a bootleg or other covering extending above the ground line. Top of such protective coverings shall be filled with a sealing compound.

16) The Contractor shall install polyethylene cable marking tape at a depth of approximately 12 inches below final grade while backfilling each cable trench. This tape shall be as specified herein.

17) The pot-heading of buried cabled shall be applied whenever cable is terminated in signal equipment and such termination is within 2 feet of the grade level. This neoprene end seal pothead shall be installed in accordance with the manufacturer's instructions.

5. Rail and Turnout Bonding Installation

   a. All non-insulated joint bars in the crossing circuited territory shall be bonded with one bond installed on the field side of the joint bars.

   b. All turnouts within the crossing approach shall be furnished with fouling wires and switch heel bonds. Track switch, frog fouling bonds, and track circuit connections shall plug-type rail web bonds.

   c. Exothermically Welded Rail Head

1) The surfaces of the rails where the bond is to be applied shall be ground clean with a reinforced grinding wheel, of a type as recommended by the bonding material manufacturer. The use of vitrified grinding wheels will not be allowed. After grinding, the surface shall be cleaned with an approved non-toxic solvent to remove all traces of grease and dirt. After the surface has been ground and cleaned, it shall be heated to drive out any moisture. The bond wire shall then be welded to the rail in a manner to ensure a thorough mechanical and electrical connection.

2) The Contractor shall ensure that each bond connection is thoroughly welded to the rail. The Engineer reserves the right to require a test of each weld by hammer and striker, or in any other manner that in the opinion of the Engineer is reasonable.

3) The Contractor shall demonstrate that the bonding is in accordance with the requirements of this Section and as specified in AREMA Communications & Signal Manual Parts 8.1.20, 8.1.30, and 8.6.40.

d. Plug-Type Rail Web Track Circuit Connections

1) Track circuit connectors shall be furnished and installed in accordance with AREMA Communications & Signal Manual Parts 8.1.20 and 8.1.25 (Type 2 plugs). The opposite end of the connectors shall have a 7 inch length of turned bond strand with a compression sleeve installed for connection to bond strand wires.

2) Rail shall be drilled in accordance with AREMA Communications & Signal Manual Part 8.6.25. Rail shall be drilled with an approved 3/8 inch bonding drill bit and drill normally used for this purpose to permit the application of the bond to the rail web.

3) No hole shall be drilled through the rail brand. Holes shall be drilled within plus or minus 3/16” of the neutral axis of the rail. All holes shall be clean and deburred. Bond wires shall be installed on the same day as the hole is drilled. In the event that bond wires cannot be installed on the same day, the bond hole shall be protected against the elements with a suitable plug.

4) Plugs shall be driven with a hammer of approximately three pounds in weight, and when in-place shall be tight to provide the best possible contact throughout the web of the rail.

5) Track circuit connectors shall be furnished and installed with insulated bond strand cable. The bond strand shall have a nominal diameter of 0.200 of an inch and be jacketed with 3/32 inch rubber compound. The bond strand shall be connected to the solid #6 insulated twisted track wire with compression sleeves and taped and insulated to prevent corrosion. The connection between track wire and bond strand shall be housed in rubber water hose to prevent damage from ballast and frost in the ground. Bond strand shall be fastened to the rail base using approved rail clips.

6) The underground cable shall be stripped back a sufficient distance for the exposed conductor to be fully inserted into the compression sleeve. The sleeve shall then be compressed with the type of compression tool designed for that purpose. The sleeve shall then be covered with two layers of vinyl plastic electrical tape.

7) A 24 inch piece of approved rubber hose shall be placed beneath the rail base to house track circuit cable and shall be sealed with approved sealing compound in a manner approved by the Engineer.

8) Any track circuit connection installed by the Contractor that is found to be defective prior to acceptance shall be removed and a new track circuit connection installed at no additional cost to MassDOT.

9) Care shall be taken to avoid excessive slack in the bond conductor to prevent vandalism.

e. Plug-Type Rail Web Turnout Bonding

1) Turnout bonding connectors shall be furnished and installed in accordance with AREMA Communications & Signal Manual Parts 8.1.20 and 8.1.25 (Type 2 plugs).

2) Rail shall be drilled in accordance with AREMA Communications & Signal Manual Part 8.6.25. Rail shall be drilled with an approved 3/8 inch bonding drill bit and drill normally used for this purpose to permit the application of the bond to the rail web.

3) No hole shall be drilled through the rail brand. Holes shall be drilled within plus or minus 3/16” of the neutral axis of the rail. All holes shall be clean and deburred. Bond wires shall be installed on the same day as the hole is drilled. In the event that bond wires cannot be installed on the same day, the bond hole shall be protected against the elements with a suitable plug.

4) Plugs shall be driven with a hammer of approximately three pounds in weight, and when in-place shall be tight to provide the best possible contact throughout the web of the rail.

5) Fouling bond wires for all turnouts within the crossing approach shall be installed as close as practicable to the transposition joints. The holes for bond wires shall be located 2-1/2” apart and centered above a tie bay.

6) The fouling wires shall be installed to allow for the plug end of the one wire to be placed on the outside of the far rail and the other end of the inside of the opposite far rail. The second wire installation shall be the reverse of the first wire.

7) Fouling wire shall be stapled to separate ties, 1-1/2” below the top of tie, opposite each other in the same tie bay. The fouling wires shall be installed to avoid touching the tie plates. Fouling wires shall be left exposed to allow visual inspection.

8) Any bond, weld, or connection installed by the Contractor that is found to be defective prior to acceptance shall be removed and a new bond installed as part of the work at no additional cost to the Contract.

f. Existing Bonding

1) If existing rail bonding is in place on the approach circuits, then the Contractor shall inspect and verify that all such bonding, including track switches, is in accordance with these specifications. If additional rail bonding, or rail bonding corrections, is required then the Contractor shall correct any such deficient existing rail bonding at no cost to MassDOT in accordance with these specifications, or as directed by the Engineer. Final determination of bonding requirements will be made by the Railroad.

6. Retirement and Disposal of Existing Equipment

   a. All retired existing AHCW equipment or passive crossing warning devices shall be removed by the Contractor and transported to a site designated by the Engineer.

7. Following the date of in-service operation, all railroad flagging and related crossing protection expense, during periods that the warning system fails to operate as intended by this specification, shall be borne by the Contractor until the system is accepted by MassDOT

TESTING

A. QUALITY ASSURANCE TESTING PROCEDURES

1. All test procedures and inspection procedures shall be subject to the approval of the Engineer and shall comply with all FRA rules and regulations.

2. Test equipment of the proper type, capacity, range, and accuracy shall be supplied by the Contractor to perform the required tests and inspections. This equipment shall be in good working order and properly calibrated at the time the tests or inspections are conducted.

3. Each component and unit of the AHCW system shall have an inspection performed at its point of manufacture, and evidence of this inspection and acceptability shall be indicated on the item where practicable.

4. Within 3 days prior to placing in service, the Contractor shall adjust all rectifiers and dc power supplies for maximum output for a period of 24 hours. Following this operation, the Contractor shall adjust the output in excess of the load requirements in accordance with the battery manufacturer’s recommendations.

5. The Engineer and the Railroad shall have the right to witness any or all field tests conducted. The Engineer and the Railroad shall be notified in writing at least 48 hours prior to each field test. No part of the AHCW system shall be placed in service without an authorized representative of MassDOT and the Railroad being present and witnessing the in-service tests, unless otherwise agreed by the Engineer.

6. The work shall include all tests required to ensure the proper and safe operation of all systems and subsystems and to prove the adequacy and acceptability of the total installation specified herein. The tests to be performed shall cause each system and subsystem to be sequenced through its required operations, including the imposition of simulated conditions to prove that the installation complies with all specified fail-safe requirements.

7. In the event of the test failure or if the system does not meet the specification requirements, necessary corrections shall be made and any and all tests or restarts to prove compliance shall be included in the work, without any additional cost to the Contract.

B. FIELD TEST PROCEDURES

1. The field tests performed shall cause each installed system and subsystem to be sequenced through its required operations, including the imposition of simulated conditions, to demonstrate that the installation complies with all specified fail-safe design requirements and operational functions.

2. The quality of the installation shall be demonstrated by field tests for continuity, insulation resistance, resistance of ground connections, circuit breakdown, visual inspection, and any other tests required by this specification. These tests shall be performed prior to any operational testing of systems or subsystems.

3. The Contractor's test procedures shall consist of pre-printed data sheets or inspection sheets for each test. When completed by the field test personnel and checked for accuracy and completeness, the sheet shall be submitted as the test report.

4. When tests require specific meter or test instrument readings, the pre-printed data sheet shall show the allowable range of values for each part of the test. The test report shall also contain a check-off system for each action and a blank space adjacent to the expected value in which to record the test readings.

5. The test report shall also contain a final description sheet on which the Contractor shall record discrepancies found and action taken. This document shall be furnished to the Engineer.

6. All test reports shall be dated and signed by the responsible employee of the Contractor or subcontractor on the day the test is performed. Space shall also be provided for the signature of the witnessing Engineer or Railroad inspector.

7. The report shall show the specific test instruments used on each test, with the instruments identified by name, type, serial number, and calibration due date.

8. Should an error be discovered during field testing, due to field wiring and connections that do not agree with the approved circuit plans, the Contractor may correct such errors without prior approval of the Engineer. The Contractor shall not, however, make any changes which affect safety of operation of the approved circuit(s) as designed, without prior written approval of the Engineer and the Railroad.

9. The Engineer and the Railroad will make all final determinations as to whether only a part, or the whole test, shall be rerun when any specific field test does not meet the requirements specified for the test.

10. Any changes made after completion of test procedure shall be retested in accordance with the applicable test procedure.

C. FIELD TESTS AND INSPECTION

1. General Field Tests. General field tests shall include, but not be limited to, the following:

   a. Ground verification test.

   b. Power racks – energy distribution system and failure alarm checks.

   c. Wiring verification of all circuitry.

   d. Vital function tests.

   e. Operating tests (Note I did not see a 234.269 test for cut out circuits) FRA requires a 90 day test of all cut-outs)

   f. All applicable tests prescribed by AREMA Signal Manual Part 2.4.1, where the AREMA inspections and tests do not conflict with the requirements of these specifications.

2. Specific Field Tests

   a. Ground Resistance Testing

      1) The Contractor shall perform testing of all signal locations using a ground resistance direct-reading single test meter utilizing alternating current fall-of-potential method and two reference electrodes.

      2) Test Procedure

         a) The ground electrode to be tested and the two reference electrodes shall be oriented in a straight line spaced a minimum of 50 feet apart.

         b) The two reference electrodes shall be driven 5 feet deep.

         c) The maximum resistance value goal of the main ground for wayside outdoor locations shall be within a range of 1 to 5 ohms. If it is found that the resistance value of the main ground exceeds this range, the Contractor shall install additional ground rods, a maximum of 4. Additional ground rods shall be spaced no less than 10 feet apart. If, after additional ground rods are installed, excessive resistance readings persist, the Contractor shall notify the Engineer.

         d) The Contractor may propose an alternate method to the fall-of-potential method for approval by the Engineer and the Railroad. Any such alternate method shall be supported by documentation that validates that the resultant measurement readings are analogous.

   b. Insulation Resistance Tests

      1) The test procedure for testing of insulation resistance shall include tests to verify the following:

         a) All wire and cable installed for vital circuits along the right-of-way and wire and cable entering or leaving wayside instrument housings shall be tested after installation to ensure that insulation of wires and cable and connected equipment meet the specified resistance value. A direct reading instrument, having a 0-megohm to 200-megohm-scale range and a self-contained dc power supply rated 500 volts minimum to 1000 volts maximum, shall be used to measure the insulation resistance. Resistance between conductors and ground shall not be less than that specified in the Federal Railroad Administration Grade Crossing Signal System Safety and State Action Plans, Part 234.267.

         b) The insulation resistance of each conductor to ground and between each conductor and all other conductors in each multi-conductor cable shall be tested. Power sources, made grounds, and connections to the rails shall be disconnected from the circuits during testing.

         c) The point used as ground shall be the most convenient ground available.

d) Insulation resistance test values shall be recorded on approved Insulation Resistance Record Forms and turned over to the Engineer and the Railroad upon their acceptance of this test requirement.

c. Energy Distribution

1) Energy-Off Tests

a) With all power to SIH or Instrument Case off, the following checks and tests shall be performed. These tests shall include but not be limited to:

1. Verify that circuit breaker size compares to that of the approved circuit plans.

2. All energy distributions shall be checked using a resistance test instrument acceptable to the Engineer and the Railroad to verify agreement with the approved plans.

3. Compare wire gauges with those called for on the approved circuit drawings. All discrepancies in wire sizes shall be replaced with the proper size wire.

4. Terminal board tags shall be verified for proper nomenclature and terminal location.

5. Each energy bus shall be tested to all other energy buses to ensure that no crosses exist.

2) Energy-On Tests

a) Upon completion of the energy-off tests, the following checks and tests shall be performed. These tests shall include but not be limited to:

1. Insert circuit breakers for power supply feeds and verify proper size according to the approved circuit drawings.

2. Turn on energy feeds and test operation of power transfer for proper operation.

3. Each ac voltage input shall be measured and recorded.

4. Each power supply or charger output voltage shall be measured and recorded.

5. Verify that the proper voltage is present at all distribution points.

6. Check circuit power failure alarms, and all other alarms that indicate to Central Control.

7. Check battery water level and specific gravity of all cells.

3) Circuit Continuity Tests

a) All wire and cable installed by the Contractor shall be tested to verify the continuity of each conductor and that each conductor is connected to the proper terminal as shown on the approved drawings. Where parallel circuits exist, each parallel path shall be tested independently to verify the continuity of each path.

4) Circuit Wiring Verification

a) All vital and non-vital circuit wiring shall be checked for accuracy against the approved circuit plans. Tests may be done with energy on or off and shall verify, but not be limited to, the following:

1. Point to point wiring

2. A wiring count of all field installed wires shall be made for each terminal, relay contact, etc. to ensure that only the number of wires called for on the approved circuit plans is present at each terminal, relay contact, etc. Any discrepancies found shall be corrected.

3. Verify tags and nomenclature where applicable.

4. Verify that all components, relays, resistors, etc. are the same as called for on the approved circuit drawings and located in proper positions.

5) Breakdown of Control Circuits

a) Each circuit shall be tested by simulating all operating conditions to verify that the circuit operates in accordance with these specifications and approved plans.

6) Power Tests

a) The following power tests shall be made and recorded:

1. The voltage of the main power feeders shall be measured and recorded.

2. A check of all circuit breakers shall be made for correct size and type.

3. All power supplies, battery chargers, and batteries shall be checked for correct setting and quantities.

4. Bus-to-bus checks shall be made to determine that no shorts, crosses, or grounds exist.

7) AHCW Operational System Tests

a) A test train shall be used to verify that any AHCW motion sensor and/or CWCS equipment installed under this Contract has the specified warning time at each highway grade crossing.

b) Tests of the AHCW systems shall be performed in both directions at various speeds to the satisfaction of the Engineer.

c) As an alternate to test train operation, the Contractor may propose a field train simulation test procedure for the approval of the Agency and the maintaining Railroad. Any such alternate procedure proposed shall be accompanied with verification documentation of such field tests performed by the Contractor for similar AHCW installation projects.

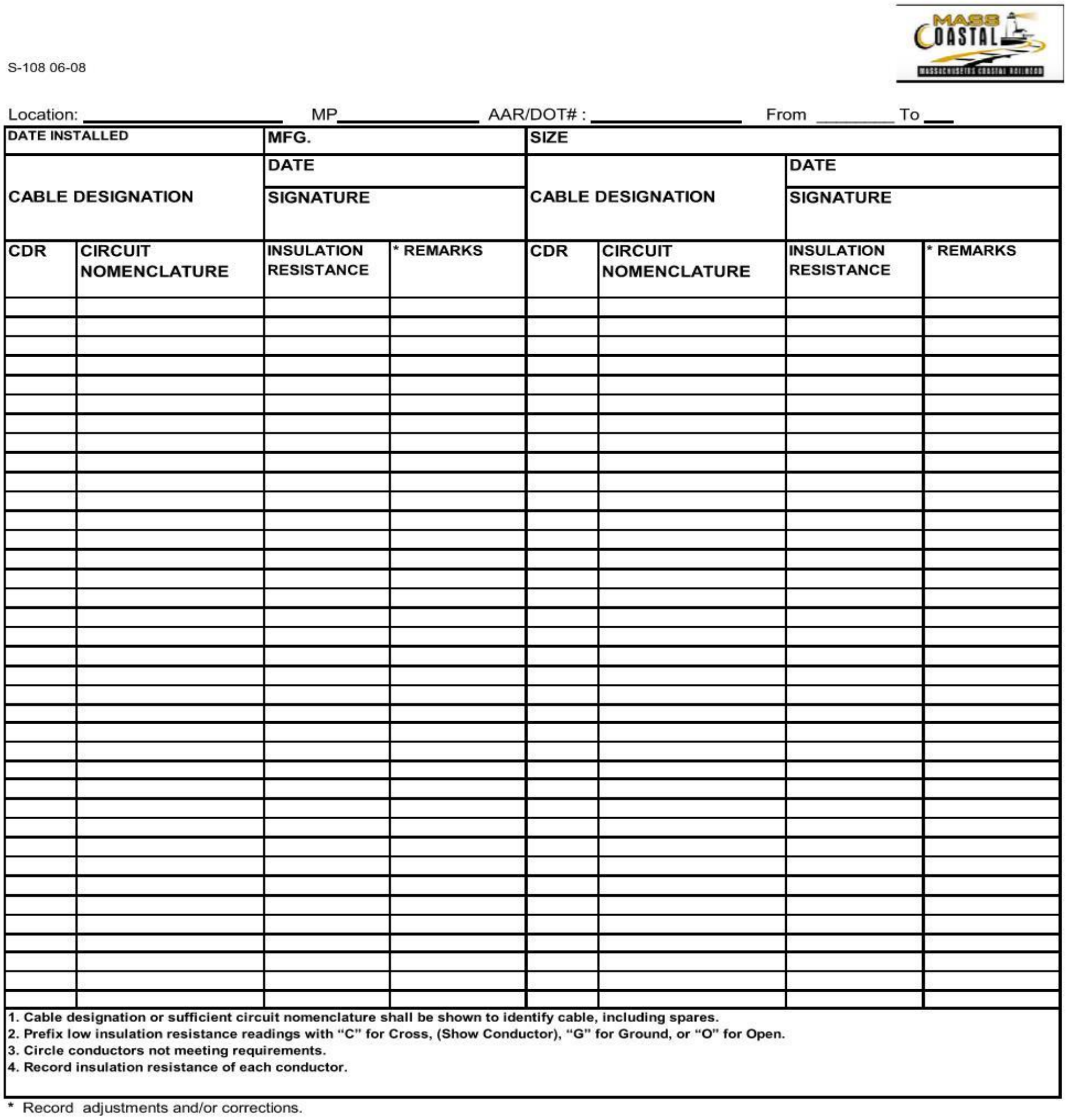
MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

MCRR STANDARD TEST FORMS

MCRR CABLE TEST (MEGGERING) STANDARD FORM



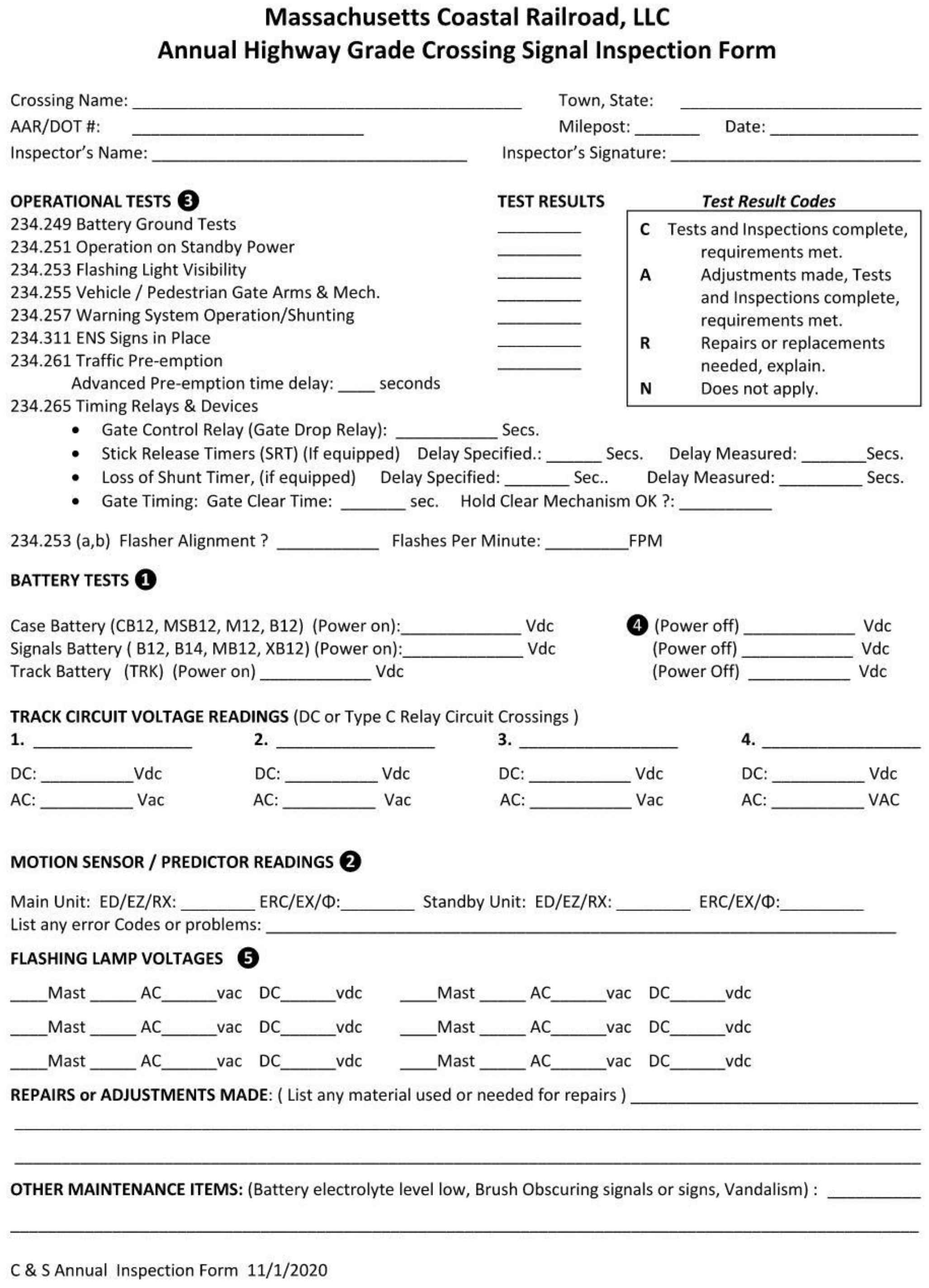
S-108 06-08

Location: ____________________ MP____________ AAR/DOT# : ______________ From ________ To ___

DATE INSTALLED		MFG.		SIZE			
CABLE DESIGNATION		DATE		CABLE DESIGNATION		DATE	
		SIGNATURE				SIGNATURE	
CDR	CIRCUIT NOMENCLATURE	INSULATION RESISTANCE	* REMARKS	CDR	CIRCUIT NOMENCLATURE	INSULATION RESISTANCE	* REMARKS

1. Cable designation or sufficient circuit nomenclature shall be shown to identify cable, including spares.
2. Prefix low insulation resistance readings with “C” for Cross, (Show Conductor), “G” for Ground, or “O” for Open.
3. Circle conductors not meeting requirements.
4. Record insulation resistance of each conductor.

* Record adjustments and/or corrections.



Massachusetts Coastal Railroad, LLC
Annual Highway Grade Crossing Signal Inspection Form

Crossing Name: ______________________________ Town, State: ____________________
AAR/DOT #: ____________________ Milepost: _______ Date: ______________
Inspector's Name: ____________________________ Inspector's Signature: ____________________

OPERATIONAL TESTS ❸ — **TEST RESULTS**

234.249 Battery Ground Tests __________
234.251 Operation on Standby Power __________
234.253 Flashing Light Visibility __________
234.255 Vehicle / Pedestrian Gate Arms & Mech. __________
234.257 Warning System Operation/Shunting __________
234.311 ENS Signs in Place __________
234.261 Traffic Pre-emption __________
Advanced Pre-emption time delay: ____ seconds
234.265 Timing Relays & Devices

- Gate Control Relay (Gate Drop Relay): ___________ Secs.
- Stick Release Timers (SRT) (If equipped) Delay Specified.: ______ Secs. Delay Measured: _______Secs.
- Loss of Shunt Timer, (if equipped) Delay Specified: _______ Sec.. Delay Measured: _________ Secs.
- Gate Timing: Gate Clear Time: _______ sec. Hold Clear Mechanism OK ?: __________

Test Result Codes

C	Tests and Inspections complete, requirements met.
A	Adjustments made, Tests and Inspections complete, requirements met.
R	Repairs or replacements needed, explain.
N	Does not apply.

234.253 (a,b) Flasher Alignment ? ___________ Flashes Per Minute: _________FPM

BATTERY TESTS ❶

Case Battery (CB12, MSB12, M12, B12) (Power on):_____________ Vdc ❹ (Power off) ____________ Vdc
Signals Battery (B12, B14, MB12, XB12) (Power on):_____________ Vdc (Power off) ____________ Vdc
Track Battery (TRK) (Power on) ____________ Vdc (Power Off) ___________ Vdc

TRACK CIRCUIT VOLTAGE READINGS (DC or Type C Relay Circuit Crossings)

1. _________________	**2.** _________________	**3.** _________________	**4.** _________________
DC: __________Vdc	DC: __________ Vdc	DC: ___________ Vdc	DC: __________ Vdc
AC: __________ Vac	AC: __________ Vac	AC: ___________ Vac	AC: __________ VAC

MOTION SENSOR / PREDICTOR READINGS ❷

Main Unit: ED/EZ/RX: ________ ERC/EX/Φ:________ Standby Unit: ED/EZ/RX: ________ ERC/EX/Φ:_________
List any error Codes or problems: ____

FLASHING LAMP VOLTAGES ❺

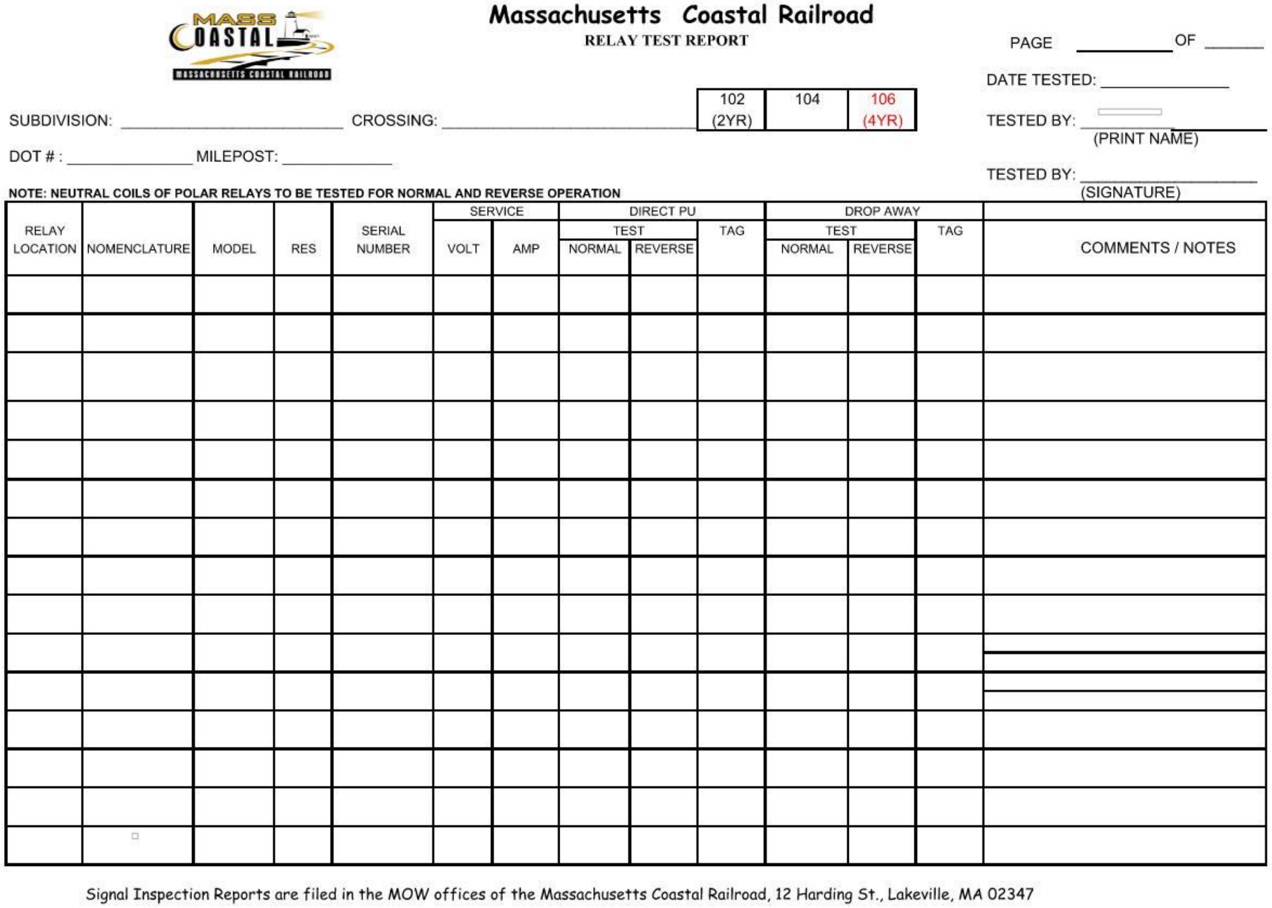
____Mast _____ AC______vac DC______vdc ____Mast _____ AC______vac DC______vdc
____Mast _____ AC______vac DC______vdc ____Mast _____ AC______vac DC______vdc
____Mast _____ AC______vac DC______vdc ____Mast _____ AC______vac DC______vdc

REPAIRS or ADJUSTMENTS MADE: (List any material used or needed for repairs) ______________________________
____
____

OTHER MAINTENANCE ITEMS: (Battery electrolyte level low, Brush Obscuring signals or signs, Vandalism) : __________
____

C & S Annual Inspection Form 11/1/2020

MCRR RELAY TEST REPORT



Massachusetts Coastal Railroad

RELAY TEST REPORT

PAGE ________ OF ______

SUBDIVISION: ______________________ CROSSING: __________________________

102 (2YR)	104	106 (4YR)

DATE TESTED: ____________

DOT # : ____________ MILEPOST: ___________

TESTED BY: ____________________
(PRINT NAME)

TESTED BY: ____________________
(SIGNATURE)

NOTE: NEUTRAL COILS OF POLAR RELAYS TO BE TESTED FOR NORMAL AND REVERSE OPERATION

					SERVICE		DIRECT PU			DROP AWAY			
							TEST		TAG	TEST		TAG	
RELAY LOCATION	NOMENCLATURE	MODEL	RES	SERIAL NUMBER	VOLT	AMP	NORMAL	REVERSE		NORMAL	REVERSE		COMMENTS / NOTES
	☐												

Signal Inspection Reports are filed in the MOW offices of the Massachusetts Coastal Railroad, 12 Harding St., Lakeville, MA 02347

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S-108 06-08

Location: ____________________ MP______________ AAR/DOT# : _______________ From ________ To ___

DATE INSTALLED		**MFG.**		**SIZE**			
CABLE DESIGNATION		**DATE**		**CABLE DESIGNATION**		**DATE**	
		SIGNATURE				**SIGNATURE**	
CDR	**CIRCUIT NOMENCLATURE**	**INSULATION RESISTANCE**	*** REMARKS**	**CDR**	**CIRCUIT NOMENCLATURE**	**INSULATION RESISTANCE**	*** REMARKS**

1. Cable designation or sufficient circuit nomenclature shall be shown to identify cable, including spares.
2. Prefix low insulation resistance readings with “C” for Cross, (Show Conductor), “G” for Ground, or “O” for Open.
3. Circle conductors not meeting requirements.
4. Record insulation resistance of each conductor.

***** Record adjustments and/or corrections.

Massachusetts Coastal Railroad, LLC
Annual Highway Grade Crossing Signal Inspection Form

Crossing Name: ____ Town, State: ___________________________
AAR/DOT #: __________________________ Milepost: _______ Date: ________________
Inspector's Name: ___________________________________ Inspector's Signature: ____________________________

OPERATIONAL TESTS ❸	**TEST RESULTS**
234.249 Battery Ground Tests	_________
234.251 Operation on Standby Power	_________
234.253 Flashing Light Visibility	_________
234.255 Vehicle / Pedestrian Gate Arms & Mech.	_________
234.257 Warning System Operation/Shunting	_________
234.311 ENS Signs in Place	_________
234.261 Traffic Pre-emption	_________

Test Result Codes

C	Tests and Inspections complete, requirements met.
A	Adjustments made, Tests and Inspections complete, requirements met.
R	Repairs or replacements needed, explain.
N	Does not apply.

Advanced Pre-emption time delay: ____ seconds

234.265 Timing Relays & Devices

- Gate Control Relay (Gate Drop Relay): ___________ Secs.
- Stick Release Timers (SRT) (If equipped) Delay Specified.: ______ Secs. Delay Measured: _______Secs.
- Loss of Shunt Timer, (if equipped) Delay Specified: _______ Sec.. Delay Measured: _________ Secs.
- Gate Timing: Gate Clear Time: _______ sec. Hold Clear Mechanism OK ?: __________

234.253 (a,b) Flasher Alignment ? ___________ Flashes Per Minute: _________FPM

BATTERY TESTS ❶

Case Battery (CB12, MSB12, M12, B12) (Power on):_____________ Vdc ❹ (Power off) ____________ Vdc
Signals Battery (B12, B14, MB12, XB12) (Power on):_____________ Vdc (Power off) ____________ Vdc
Track Battery (TRK) (Power on) ____________ Vdc (Power Off) ____________ Vdc

TRACK CIRCUIT VOLTAGE READINGS (DC or Type C Relay Circuit Crossings)

1. __________________	**2.** __________________	**3.** __________________	**4.** __________________
DC: __________Vdc	DC: __________ Vdc	DC: ___________ Vdc	DC: __________ Vdc
AC: __________ Vac	AC: __________ Vac	AC: ___________ Vac	AC: __________ VAC

MOTION SENSOR / PREDICTOR READINGS ❷

Main Unit: ED/EZ/RX: ________ ERC/EX/Φ:________ Standby Unit: ED/EZ/RX: ________ ERC/EX/Φ:_________
List any error Codes or problems: ____

FLASHING LAMP VOLTAGES ❺

____Mast _____ AC______vac DC______vdc	____Mast _____ AC______vac DC______vdc
____Mast _____ AC______vac DC______vdc	____Mast _____ AC______vac DC______vdc
____Mast _____ AC______vac DC______vdc	____Mast _____ AC______vac DC______vdc

REPAIRS or ADJUSTMENTS MADE: (List any material used or needed for repairs) ________________________________
____
____

OTHER MAINTENANCE ITEMS: (Battery electrolyte level low, Brush Obscuring signals or signs, Vandalism) : __________
____

C & S Annual Inspection Form 11/1/2020

Massachusetts Coastal Railroad

RELAY TEST REPORT

PAGE ________ OF ______

DATE TESTED: _______________

102 (2YR)	104	106 (4YR)

SUBDIVISION: __________________________ CROSSING: ______________________________

DOT # : ______________ MILEPOST: _____________

TESTED BY: ______________________
(PRINT NAME)

TESTED BY: ____________________
(SIGNATURE)

NOTE: NEUTRAL COILS OF POLAR RELAYS TO BE TESTED FOR NORMAL AND REVERSE OPERATION

RELAY LOCATION	NOMENCLATURE	MODEL	RES	SERIAL NUMBER	SERVICE		DIRECT PU			DROP AWAY			COMMENTS / NOTES
							TEST		TAG	TEST		TAG	
					VOLT	AMP	NORMAL	REVERSE		NORMAL	REVERSE		
	☐												

Signal Inspection Reports are filed in the MOW offices of the Massachusetts Coastal Railroad, 12 Harding St., Lakeville, MA 02347

SIGNAL EQUIPMENT REMOVAL

GENERAL

A. The Contractor shall remove and dispose of all equipment, materials and facilities retired as result of his work under this Contract. The Contractor shall also remove and dispose of equipment, materials and facilities presently out-of-service at each Contract location. All re-useable (as determined by Railroad) signal equipment removed as part of the project shall be sorted, inventoried and delivered to a MCRR or MassDOT storage facility within a 75 mile radius of each crossing and stacked neatly in a location as directed by MCRR/MassDOT. All other material deemed unusable by Railroad is to be picked up and loaded into the scrap container at a MCRR or MassDOT storage facility within a 75-mile radius of each crossing as directed by MCRR/MassDOT. All hazardous material including retired batteries and concrete debris shall be disposed of at the expenses of the Contractor. Location of the dumpster will be provided to successful bidder. All proceeds from the sale of scrap material will go to MassDOT/MCRR.

B. The Engineer will determine the final disposition of retired material and equipment prior to scheduled removal. Material and equipment that cannot be identified as either salvage, or scrap, shall be stored by the Contractor, in a secured area, until such time that the final disposition is determined. The Contractor shall provide the approved documentation recording the delivery of the materials and acceptance by the Engineer.

C. The Contractor shall keep detailed records, of all material and equipment to be retired. All material retired as a result of this Contract; whether salvaged or removed from the right-of-way by the Contractor shall be accounted for.

D. Removal, extraction or demolition of materials and equipment shall result in the complete elimination of all designated element of existing facilities from the site. Unwanted material and associated debris shall be disposed of in an approved manner with the Contractor responsible for all required permits.

E. All staged or temporary work shall be removed from the site and the site shall be restored to the original condition.

QUALITY ASSURANCE

A. Remove retired equipment as shown on the Contract Drawings and described herein and remove debris from the site. Use such methods as required to complete the work within the limitations of governing regulations.

B. All the work specified herein shall be performed in close coordination with and under the supervision of the Railroad personnel prior to and during the actual removal, salvage and disposal of any existing signal, communications and electrical system equipment.

SUBMITTALS

A. Prior to commencement of construction activity, the Contractor shall submit for approval proposed material and methods for protection of existing equipment.

B. The Contractor shall submit a proposal describing methods and means by which the existing facilities will be removed and/or protected-in-place, including plans required to illustrate proposal for each location. The submittal shall include sufficient information to enable evaluation by the Engineer of the adequacy of the proposal to provide removal and/or protection. Approval of a typical plan shall not relieve the Contractor from the requirement of providing additional or more specific submittals as the Engineer deems necessary to suit conditions. Submittals shall be provided no later than three weeks prior to the scheduled date of the removal.

C. Submit fully executed copies of all permits, if any.

D. Submit a standard form to be used for documenting removal, storage, and disposal of existing materials due to the work of this Contract.

DELIVERY, STORAGE AND HANDLING

A. The Contractor shall store all material and equipment deemed to be salvage, in an approved secured area, until such time as it can be delivered to the Operating Railroad as directed by the Engineer.

B. The Contractor shall be responsible for any damage to materials and equipment sustained during removal, demolition, storage or delivery. Damaged material and/or equipment shall be repaired or replaced by the Contractor at no additional cost to the Contract.

REMOVAL AND DISPOSAL

A. All demolition and disposal shall be performed in accordance with applicable codes, and all Federal, State, and Local requirements.

B. Provide labor, material, equipment, and services necessary to perform any temporary or interim work required to facilitate the demolition and removal of materials and equipment required under this Contract.

C. Prior to the beginning of demolition all existing signal facilities within construction area shall be surveyed by the Contractor and the Engineer.

1. Prior to removal of any facilities, the Contractor shall inspect the existing equipment for any damage and shall report any existing damage to the Engineer in writing.
2. Any facilities found damaged at the time of Engineer acceptance and not previously reported shall be repaired or replaced in-kind by the Contractor at no additional cost to the Contract.

D. Signal equipment that is the subject to reuse as identified by the Engineer shall be labeled and disconnected in a careful manner so as to avoid any damage. Notify the Engineer at least three days in advance when equipment to be salvaged is ready to be identified. The contractor shall:

1. Remove and place equipment to be salvaged in a crate, box, or pallet and deliver to the location designated by the Engineer.

2. Unload and stack the salvaged material at the designated location. All material not designated by the Engineer to be salvaged shall be removed and disposed of by the Contractor.

E. The Contractor shall prepare material salvage reports, in quadruplicate on the approved forms, listing item description, location, condition, and date delivered. Upon delivery Engineer will verify receipt by signature. The Contractor shall tender three copies to the Engineer.

F. The process and the manner of carrying out the removal of the existing signal facilities shall not incur any damage to these facilities or other existing facilities, nor shall it adversely affect the new signal equipment installed under this Contract. Any work required to repair and replace existing facilities damaged by the Contractor during the removal work shall be carried out at no additional cost to and without any delays to the Contract.

G. No signal system facilities retired under this Contract shall be abandoned in-place unless specifically described herein or by Engineer direction.

1. Retired aerial cables, including the messenger, and all associated cable straps, shall be removed and scrapped.

2. Poles to be removed shall be pulled out and removed to an appropriate site. If pulling out is not practicable, cut (6) inches below finished grade and remove to an appropriate site.

3. Existing direct buried cables, that are to be retired, shall be abandoned in place, but ends shall be cut back to twenty (20) inches below finished grade.

H. Where retired facilities leave a mounting or securing remnant that cannot be removed and results in a protrusion or void, the protrusion or void shall be rendered non-hazardous to the personnel or railroad operations in a manner approved by the Engineer.

I. Existing foundations, that are to be retired or are out of service shall be excavated, backfilled, and disposed of.

J. Rail bonds, potheads, cable leads, and rail connections shall be removed and disposed of, in an approved manner off-site and remnants buried to a depth of 30 inches.

K. Wayside signal assemblies including ladders, brackets, signs, junction boxes and cases designated to be removed shall be removed and delivered to the Railroad.

L. All non-salvaged signal material removed from the project shall be delivered to the approved disposal site as submitted in the Contractor's "Certificate of Dumping Facilities" in the Contract Proposal.

M. The Contractor shall remove and dispose of all retired cable presently installed inside ducts, conduits or other raceways disconnected under this Contract to enable reuse of raceways unless otherwise directed by the Engineer.

PROTECTION OF FACILITIES

A. The Contractor shall protect in place all equipment identified as temporary or permanent to avoid any damage during the execution of the work.

B. The Contractor shall protect the existing track structure from damage and shall protect the existing ballast from contamination.

C. Any equipment damaged by Contractor shall be replaced in-kind with new, without time extension and at no additional cost to the Contract.

CLEAN UP

A. After completion of any part of Work, the Contractor shall remove all protective materials from the signal equipment and dispose of that material off-site as specified herein.

B. Any excavation shall be returned to final grade.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

AS-BUILT CONSTRUCTION PLANS

DESCRIPTION OF WORK

A. This Section specifies the general requirements and procedures for preparing As-Built Construction Plans. As-Built plans are not intended to document final quantities, but are intended to show approved revisions to the contract design including, but not limited to: revised profiles and cross sections; revised typical sections; revised drainage and utilities installations; revised track and signal design; and/or any changes to the demolition and removal items and any other changes to the original design or details.

GENERAL

A. The survey data shall be obtained by Global Positioning Survey (GPS) and certified by a Professional Land Surveyor registered in Massachusetts.

B. Contractor shall furnish paper “AS BUILT” plans, two (2) paper 11x17 bound copies of the completed project plans, and two (2) electronic file in AutoCADD 2016 Civil 3D on a labeled disk or portable USB drive to Engineer. These “AS BUILT” plans shall be furnished prior to the date of the final acceptance. Engineer will make the original drawings available to Contractor for the making of duplicates for use in preparing the as-built drawings.

C. The following standards shall be applicable:

1. Text: Text shall be drawn using a STYLE of "L100-XX" (where XX refers to the plotted scale) and a font file of "SIMPLEX" as defined in the AutoCAD survey template provided by the Engineer. The style shall be defined as a "fixed height" style, and have a height of 0.10 times the drawing plotted scale. (i.e. 4.0 for 40 scale plan, 2.0 for 20 scale etc.).

2. Precision and Accuracy:
   a. Horizontal Survey:
      1) Precision: Horizontal control and surveyed points shall maintain a minimum precision of 1:10,000.
      2) Accuracy: No more than 10% of the survey points shall be in error by more than 1/100 inch or 0.25 mm when viewed at the requested scale.
   b. Vertical Survey:
      1) Precision: Vertical Control shall have a maximum error of closure no greater than .075 feet or .02 meters.
      2) Accuracy: No more than 10% of elevations when interpolated from a Surface shall be in error of more than 1/2 a contour interval.

3. Surface Data: The data format shall conform to Autodesk Civil 3D Project files. If the Contractor uses a different software product to create a surface, then the surface must be

represented as a TIN (Triangulated Irregular Network) of 3D lines on a separate, distinct layer within the AutoCAD drawing file. 3D faces or 2 dimensional.

D. Drawings shall include approved design changes during construction. The plan sheets (or any other “job site record document”) revised after award of contract shall include a complete account and detail of the revisions and design changes. The party responsible for the revisions shall have a Professional Engineer (P.E.) seal each altered plan sheet (or any other “job site record document” with a seal). This documented information is to be part of the As-Built Plan requirements.

E. As-built plans shall be neat, legible and of the correct size. MassDOT Rail and Transit Projects and any projects which include Plan, Profile, Cross-Section and Detail Sheets shall be full size. As-built plan size shall match the issued plan set size. In general, if the plan set was issued at 11”x17”, the As-Built shall be 11”x17”.

F. All revisions to the original plans shall be delineated in red, located properly on the drawing, they shall be legible and true to scale.

G. As-built plan, profile, cross section and detail sheets shall be designated as such by note or stamp “As-Built” in black. As-built plans shall be bound in the same manner as they were issued.

H. Changes to the issued design by any outside agency shall have their plans added to the As-built plan set. This includes but is not limited to: encroachment permit projects, enhancements, procurements, inter-governmental agreements (IGA), local public agency (LPA) projects and any other agency, private or public, making changes to the existing infrastructure or design. For each new or relocated utility installed, including those installed or relocated by others in the project area, perform an as-built location survey by coordinates prior to backfilling the excavation.

SUBMITTALS

A. The person or agency responsible for the work shall submit to MassDOT (Owner) a set of As-built plans which meet the requirements of this specification.

B. A complete digital base plan shall be provided in AutoCAD Civil 3D DWG format Release 2014 or later on a Compact Disk (CD) or portable USB drive, properly referenced to the proper coordinate system. The final As-built plans shall be submitted within forty-five (45) days following the substantial work complete date of the project.

MEASUREMENT AND PAYMENT

A. Measurement and Payment of the work items included in this contract are defined under the bid items listed in the Bid Form. All costs associated with the work in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

END OF SECTION

ALLOWANCES

DESCRIPTION OF WORK

A. This Section specifies allowances for all services, personnel, labor, materials, and equipment necessary to perform the work as specified herein. Contractor shall include in his bid proposal the allowance for each item listed. Except for when Contractor performs the work, he shall not add any Contractor markups, including overhead and profit, except as noted, to these allowance items.

DEFINITIONS

A. Risk Allowance – An allowance of contingency funds which is included as a line item in the Contract. The use of this allowance is solely at the discretion of MassDOT and will be authorized only through execution of a Risk Reallocation.

B. Risk Reallocation – A document executed and issued to the Contractor by MassDOT amending the Contract and reallocating funds from or to the Risk Allowance line item within the Contract without changing the contract value. All Risk Reallocations will be processed in the same manner as Change Orders are processed in accordance with MassDOT's most recent general conditions applicable to construction contractor Change Orders. All provisions contained in the Contract applicable to Change Orders shall also apply to Risk Reallocations.

ALLOWANCE ITEMS

A. Environmental Allowance:

1. Allowance of the stipulated sum of $40,000 for permitting conditions requirements. Allowance to perform the work necessary to meet any requirements of the Conditions in the Order of Conditions to be issued by any Conservation Commission and/or the determination to be issued by the State or Federal Authority Having Jurisdiction. Contractor will be reimbursed for the actual cost of performing the work required by the Environmental Permit(s) as determined by the Engineer up to a maximum Allowance of $40,000.

B. Commercial Power Upgrades Allowance:

1. Allowance of the stipulated sum of $40,000 for work that the Contractor have to pay to the third party for work related to modifications of power service necessary to provide power to signal equipment cases at:

   - South Crane Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 7.81
   - Harrison Avenue, Taunton, Massachusetts – Middleboro Subdivision MP 10.97
   - Weir Street, Taunton, Massachusetts – Middleboro Subdivision MP 11.25
   - Hart Street, Taunton, Massachusetts – Middleboro Subdivision MP 12.17

2. Contractor will be reimbursed for the actual cost of services, including material, equipment and labor billed by a third party (Utility Company) for the work required to provide new power service at the locations listed above up to maximum amount of $40,000.

C. Risk Allowance:

1. Allowance of the stipulated sum of $575,000 to address unforeseen issues that may occur on the project. MassDOT has established an allowance of contingency funds to incorporate Unforeseen Changes in the Work. The use of this allowance to incorporate these Unforeseen Changes is solely at the direction of MassDOT and use of this allowance is authorized only through execution of a Change Order due to unforeseen issues.

MEASUREMENT AND PAYMENT

A. Allowance will be made to reimburse Contractor for work and materials performed and supplied by Contractor and others as specified herein and as further specified in the applicable Construction Specifications Sections and/or Bid Form.

PAYMENT

A. Before beginning work under any allowance, Contractor shall request an itemized written estimate of cost from the utility companies, private firms, subcontractors, and City and State agencies for the work to be performed. Contractor shall submit these written estimates to MassDOT for review and approval. For work performed by Contractor, she/he shall be reimbursed in accordance with the requirements specified under this Section shall be included in the bid price for the respective bid item.

B. Payment for allowances will be based on Time and Material, receipted invoices and signed receipts, without charges for Contractor overhead and profit (except when the Contractor performs the work), submitted for the actual work performed.

C. Allowance will be made to reimburse Contractor for work performed and materials supplied by Contractor and others as specified herein and as further specified in the applicable Construction Specifications Sections.

D. Contractor shall submit receipted copies of itemized invoices for such work to MassDOT for payment. Payment will be based upon receipted invoices and signed receipts from the utility companies, private firms, subcontractors or the City and/or State agencies to Contractor, one copy of which shall be submitted to MassDOT.

E. Each allowance will be adjusted to the actual amount paid by the Contractor for such work done.

END OF SECTION

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

SPECIAL CONDITIONS

1. MATERIALS FURNISHED BY MASSDOT(OWNER)

A. Relay Tie Plates – 107NH

MassDOT will furnish all relay tie plates required for the Project. Relay tie plates are stockpiled at a MassDOT storage facility within a 75 mile radius of each crossing. Contractor shall be responsible for pick-up and transportation of relay tie plates from storage site; and installation of the relay tie plates in accordance with the provisions of the Contract Drawings, Project Description, Scope of Work, Technical Specifications, Special Conditions, AREMA Manual for Railway Engineering, and the MassDOT MW-1. Installation of tie plates is incidental to the type of work being performed. Contractor shall be responsible for returning all unused relay tie plates to a MassDOT storage facility within 75 miles of each crossing, as directed by MassDOT per the project Technical Specifications and Special Conditions. Contractor shall be responsible for replacing any missing tie plates which it fails to properly secure.

B. Relay Rail – 107NH

MassDOT will furnish all 107NH relay rail as required for the Project. Relay rail is stockpiled at a MassDOT storage facility within a 75 mile radius of each crossing. Contractor shall be responsible for pick-up and transportation of replacement rail from a storage site, safeguarding the material prior to installation, and installing the relay rail in accordance with the Scope of Work, Technical Specifications, Special Conditions, MassDOT MW-1, and AREMA Recommended Practices contained in Volume 1, Chapter 5 of the AREMA Manual for Railway Engineering. Contractor shall be responsible for returning all unused 107NH to a MassDOT Storage Facility within 75 miles of the Project location, as directed by MassDOT and Contractor shall be responsible for replacing any missing rail which it fails to properly secure.

C. Joint Bars – Relay 107NH

MassDOT will furnish relay 107NH joint bars as required for the Project. All joint bars are stockpiled at a MassDOT storage facility within a 75 mile radius of each crossing. Contractor shall be responsible for pick-up and transportation of joint bars from the storage site safeguarding the material prior to installation, and installing the joint bars in accordance with the provisions of the Scope of Work, Technical Specifications, Special Conditions, MassDOT MW-1 and AREMA Recommended Practices contained in Volume 1, Chapter 5 of the AREMA Manual for Railway Engineering.

D. Rejection of Unsuitable Railroad – Furnished Materials

1. MassDOT furnished relay rail, joint bars and tie plates found defective shall be recovered as scrap and returned to a MassDOT storage facility within 75 miles of each crossing, as directed by MassDOT.

2. MATERIALS FURNISHED BY CONTRACTOR

A. New Rail – New 136RE

Contractor shall furnish and install new 136RE rails in thirty-nine or forty foot (39’ or 40’) lengths and eighty foot (80’) lengths, as required, conforming to the requirements of the AREMA Manual for Railway Engineering, Volume 1, Chapter 4. The Contractor will be responsible for all loading, unloading, handling, storing and safeguarding of the material prior to installation, and installing the rail in accordance with the provisions of the Contract Plans, Scope of Work, Technical Specifications, the MassDOT MW-1 and AREMA recommended practices.

B. New Rail – New 115RE

Contractor shall furnish and install new 115RE rails in thirty-nine or forty foot (39’ or 40’) lengths and eighty foot (80’) lengths, as required, conforming to the requirements of the AREMA Manual for Railway Engineering, Volume 1, Chapter 4. The Contractor will be responsible for all loading, unloading, handling, storing and safeguarding of the material prior to installation, and installing the rail in accordance with the provisions of the Contract Plans, Scope of Work, Technical Specifications, the MassDOT MW-1 and AREMA recommended practices.

C. New Wood Crossties (7”x 9”x 8’-6”)

Contractor shall furnish and install all wood crossties (7” x 9” x 8’-6”) at all grade crossing locations for the project. Wood crossties are to be 100% oak (typically 85% oak with balance mixed hardwoods), fully end-plated and conform to all applicable MassDOT Specifications. Contractor shall be responsible for all loading, unloading, handling and safeguarding of the material prior to installation, and installing the crossing ties in accordance with the Contract Drawings, Project Description, Scope of Work, Technical Specifications, MassDOT MW-1, and AREMA Recommended Practices contained in Volume 1, Chapter 5 of the AREMA Manual for Railway Engineering.

Note: Any crossties found defective at the time of installation shall be clearly marked “TIE NG” in fluorescent spray paint on two sides and shall be separated and left by Contractor in the stockpile area as directed by Railroad representative on-site.

D. New Crossing Wood Crossties (7” x 9” x 9’)

Contractor shall furnish and install all 9’ crossing wood crossties (7” x 9” x 9’) at all grade crossing locations with rubber rail seal and HMA for the project. Wood crossties are to be 100% oak, fully end-plated and conform to all applicable AREMA Specifications. Contractor shall be responsible for all loading, unloading, handling and safeguarding of the material prior to installation, and installing the crossing ties in accordance with the Contract Drawings, Project Description, Scope of Work, Technical Specifications, MassDOT MW-1, and AREMA

Recommended Practices contained in Volume 1, Chapter 5 of the AREMA Manual for Railway Engineering.

Note: Any crossties found defective at the time of installation shall be clearly marked “TIE NG” in fluorescent spray paint on two sides and shall be separated and left by Contractor in the stockpile area as directed by Railroad representative on-site.

E. Compromise Joint Bars - New 115 RE/107 RE, 131 RE/136 RE, and 136 RE/115 RE

Contractor shall furnish a sufficient quantity of new 115 RE/107 RE, 131 RE/136 RE, and 136 RE/115 RE compromise joint bar sets required to complete the work of this project. Compromise joint bars are to be 6-hole, forged steel and meet AREMA Manual for Railway Engineering, Volume 1, Chapter 5, Part 2 standards. Each compromise joint bar set is to include all track bolts, nuts and spring washers. Track bolts, nuts and spring washers shall be of proper size for joining of the rail sections(s) to be installed and conform to AREMA Specifications for Heat-Treated Carbon Steel Bolts, Nuts and Spring Washers, Chapter 4, Sections 3.5 and 3.6. Contractor shall be responsible for all loading, unloading, handling, storing and safeguarding of the material prior to installation. Contractor shall install all compromise joint bars in accordance with the provisions of the Contract Drawings, Scope of Work, Technical Specifications, MassDOT MW-1 and the AREMA recommended practices.

G. Compromise Thermite Weld Kits

Contractor shall furnish a sufficient quantity of new 115 RE/107 RE, 131 RE/136 RE, and 136 RE/115 RE compromise thermite weld kits required to complete the work of this Project. The 115 RE/107 NH thermite welds can be used **in lieu of 115 RE/107 NH compromise joint bars (Contractor’s choice).** Thermite Weld kits shall be Orgo Thermit Degradable Welding Kit or approved equal. Contractor shall provide qualified personnel to perform the welding of rail, including qualified UT Tester(s). Contractor shall submit proof of certification for each Welder to MassDOT/MCEER for review and approval. Contractor shall furnish all pertinent equipment, tools, and associated hardware necessary for the installation of the Thermite Welds per the Manufacturer’s recommendations and in accordance with the provisions of the Contract Drawings, Scope of Work, Technical Specifications, MassDOT MW-1 and the AREMA recommended practices.

H. Thermite Weld Kits – 115RE, 136RE

Contractor shall furnish a sufficient quantity of new 115 RE and 136 RE thermite weld kits required to complete the work of this Project**.** Thermite Weld kits shall be Orgo Thermit Degradable Welding Kit or approved equal. Contractor shall provide qualified personnel to perform the welding of rail, including qualified UT Tester(s). Contractor shall submit proof of certification for each Welder to MassDOT for review and approval. Contractor shall furnish all pertinent equipment, tools, and associated hardware necessary for the installation of the Thermite Welds per the Manufacturer’s recommendations and in accordance with the provisions of the Contract Drawings, Scope of Work, Technical Specifications, MassDOT MW-1 and the AREMA recommended practices.

Failed welds shall be the responsibility of Contractor and repaired/replaced as required at no additional cost to the Project.

I. Rubber Rail Seal

Contractor to furnish and install Rubber Rail Seal for 115 RE and 136RE rail section grade crossing material complying with the requirements of Technical Specifications Section GRADE CROSSING (RUBBER RAIL SEAL). One (1) foot of Rubber Rail Seal on gage side and field side of both rails, fully installed per the manufacturer’s recommendation shall constitute one (1) Track Foot (TF) of Rubber Rail Seal Installation.

Contractor shall furnish all pertinent equipment, tools, and associated hardware necessary for the installation of the Rubber Rail Seal per the Manufacturer’s recommendations and in accordance with the provisions of the Contract Drawings, Project Description, Scope of Work, Technical Specifications, MassDOT MW-1, and AREMA Recommended Practices.

J. 115RE Tie Plates

Contractor shall furnish a sufficient quantity of new, 14” x 5 ½” base, double shoulder steel railroad plates in conformance with AREMA Manual for Railway Engineering, Volume 1, Chapter 5, Part 1, Figure 5-1-6. Plan No. 8 – AREMA 14 Inch Tie Plate for 5-1/2 Inch Rail Base Width, Punching A for use with 5/8” track spikes and 7” x 9” wood crossties required to complete the work for this Project. Plates shall conform to the pertinent requirements of the AREMA Manual for Railway Engineering, Volume 1, Chapter 5, Part 1. Contractor shall be responsible for all loading, unloading, handling, storing and safeguarding of the material prior to installation, and installing the plates in accordance with the provisions of the Contract Plans, Scope of Work, Technical Specifications, MassDOT MW-1 and AREMA recommended practices.

K. 136RE Tie Plates

Contractor shall furnish a sufficient quantity of new, 14” x 6” base, double shoulder steel railroad plates in conformance with AREMA Manual for Railway Engineering, Volume 1, Chapter 5, Part 1, Figure 5-1-8. Plan No. 12 – AREMA 14 Inch Tie Plate for 6 Inch Rail Base Width, Punching A for use with 5/8” track spikes and 7” x 9” wood crossties required to complete the work for this Project. Plates shall conform to the pertinent requirements of the AREMA Manual for Railway Engineering, Volume 1, Chapter 5, Part 1. Contractor shall be responsible for all loading, unloading, handling, storing and safeguarding of the material prior to installation, and installing the plates in accordance with the provisions of the Contract Plans, Scope of Work, Technical Specifications, MassDOT MW-1 and AREMA recommended practices.

L. Spikes

Contractor shall furnish and install all new track spikes required in order to meet the specifications and complete the work on this project. Track spikes shall be new, five-eighths of an inch (5/8”) x six inches (6”) long, cut spikes conforming to the requirements of the AREMA Manual for Railway Engineering, Volume 1, Chapter 5, Part 2. Contractor shall be responsible for all loading, unloading, handling and safeguarding of the material prior to installation. Contractor shall be required to have a sufficient quantity of spikes on hand at all times. Contractor shall install all spikes in accordance with the Contract Drawings, Project Description, Scope of Work, Technical Specifications, MassDOT MW-1, and AREMA Recommended Practices contained in Volume 1, Chapter 5 of the AREMA Manual for Railway Engineering.

Installation of track spikes in this contract is considered incidental to the other trackwork identified in the bid form.

M. Rail Anchors – 107NH, 115RE, 131RE and 136RE

Contractor shall furnish and install all rail anchors compatible with 107NH, 115RE, 131RE and 136RE rail sections in order to meet the specifications and complete the work on this project. Contractor shall be responsible for all loading, unloading, handling and safeguarding of the material prior to installation. Contractor shall install the rail anchors in accordance with the Contract Drawings, Project Description, Scope of Work, Technical Specifications, MassDOT MW-1, and AREMA Recommended Practices contained in Volume 1, Chapter 5 of the AREMA Manual for Railway Engineering.

Contractor shall replace any missing or broken rail anchors from the lot at no additional cost to Owner or Railroad. Installation of rail anchors in this contract is considered incidental to the other trackwork identified in the bid form.

N. Hot Mix Asphalt Pavement

Hot Mix Asphalt (HMA) Pavement complying with the requirements of Technical Specification Section HOT MIX ASPHALT (HMA) PAVEMENT shall be furnished by Contractor. Contractor shall install the HMA at locations and in accordance with the provisions of the Contract Plans, Scope of Work, Technical Specifications, AREMA Recommended Practices, and the MassDOT MW-1.

O. Track Bolt Assemblies

Contractor shall furnish new track bolts, nuts and spring washers for all standard and compromise bolted joints. Railroad requires that each joint installed have a minimum two (2) bolts installed in each rail. Track bolts, nuts and spring washers shall be of proper size for drilling of the rail section to be installed and conforming to AREMA Specifications for Heat-Treated Carbon Steel Bolts, Nuts and Spring Washers, Chapter 4, Sections 3.5 and 3.6. Contractor shall install all bolts in accordance with the provisions of the Contract Drawings, Project Description, Scope of Work, Technical Specifications, MassDOT MW-1, and AREMA Recommended Practices contained in Volume 1, Chapter 5 of the AREMA Manual for Railway Engineering. Installation of the track bolts in this contract is considered incidental to the other trackwork identified in the bid form.

P. Ballast

Contractor shall furnish, distribute, and install all stone track ballast required for this project. Ballast shall meet the requirements of AREMA No. 4, maximum size 1-1/2”, durable, full-face fractured granite rock in accordance with AREMA Manual for Railway Engineering, Volume 1, Chapter 1, Part 2. Contractor shall provide ballast from quarries pre-approved by MassDOT. Contractor shall be responsible for all loading, unloading, handling and safeguarding of the material prior to installation. Ballast for all work in this contract shall be installed in accordance with the provisions of the Contract Drawings, Project Description, Scope of Work, Technical Specifications, MassDOT MW-1, and AREMA Recommended Practices contained in Volume 1, Chapter 5 of the AREMA Manual for Railway Engineering.

Q. Liquid Plugging Compound

Contractor shall furnish and install all liquid plugging compound necessary for filling spike holes prior to re-spiking tie plates during crosstie and switch timber replacement and re- gaging of track. Contactor shall submit the type of plugging compound to Owner and Railroad for approval prior to use of the compound. The plugging compound shall have characteristics equivalent to, or greater than that of, the Willamette Valley Company SPIKEFAST® ES-50 RM formula. It is Contractor's responsibility to ensure that the plugging compound is being applied in a manner that is consistent with the manufacturer's instructions. Contractor shall be responsible for all loading, unloading, handling and safeguarding of the material prior to installation. Spike holes shall be filled in completely with the approved plugging compound in accordance with the provisions of the Contract Drawings, Project Description, Scope of Work, Technical Specifications, MassDOT MW-1, and AREMA Recommended Practices. Installation of the liquid plugging compound for all work in this contract shall be incidental to installation of crossties.

S. Guardrail

Contractor shall furnish and install guardrail with steel post and end treatment in accordance with MassDOT Standard M8.07.0. and shall be constructed in conformance with MassDOT Standard SubSection 601.

T. Pavement Markings

Contractor shall furnish and install thermoplastic reflectorized pavement markings in accordance with MassDOT Standard M7.01.03 and M7.01.04 and shall be constructed in conformance with MassDOT Standard SubSection 860.

*At each crossing the Contractor shall repaint all existing DYL, SWL, grade crossing warning pavement markings (MUTCD Figure 8B-7) and stop bars.

U. Crusher Run and Filter Fabric

Contractor shall furnish, install and remove crusher run material for a temporary roadway access over existing track section. The Contractor shall furnish, install and remove filter fabric to protect new and existing track and ballast section from damage and fines.

3. REMOVAL AND DISPOSAL OF TRACK MATERIAL

A. Rail

All rail recovered from work associated with this project shall be sorted by rail section. Any rail deemed re-usable shall be delivered to a MassDOT Storage Facility within 75 miles of each crossing and stacked neatly in a location as directed by MassDOT and in accordance with the provisions of the Contract Plans, Scope of Work and Technical Specifications. All proceeds from the sale of scrap rail and scrap OTM will go to MassDOT.

B. Joint Bars, Bolts, Tie Plates, and Anchors (Relay and New)

All re-useable (as determined by Railroad) joint bars, bolts, tie plates, and anchors removed as part of the project and not re-used in track construction shall be sorted, inventoried and delivered to a MassDOT storage facility within a 75 mile radius of each crossing and stacked neatly in a location as directed by MassDOT. All OTM deemed un-useable by Railroad is to be picked up and loaded into the scrap container at a MassDOT storage facility within a 75-mile radius of each crossing as directed by MassDOT. All proceeds from the sale of scrap rail and scrap OTM will go to MassDOT.

C. Spikes

All spikes removed as part of this project shall be recovered as scrap, picked up and loaded into the scrap container at a MassDOT storage facility within a 75-mile radius of each crossing. All proceeds from the sale of scrap rail and scrap OTM will go to MassDOT.

D. Crossties, Switch Timber, and Crossing Timber

All removed crossties are to be picked up, bundled (if possible) and delivered to an approved disposal site, licensed for processing of creosote-treated railroad ties, to be disposed of in accordance with EPA requirements. Contractor shall submit copies of the states DEP Certification and weight slips to MassDOT from the disposal facility when submitting their invoices. Weight slips shall be clearly marked with the name of the disposal facility, date, tonnage stamp and place of origin.

E. Asphalt, Concrete, Rubber and Excavated Materials

All excavated earth, asphalt, concrete and rubber roadway material shall be disposed of in accordance with State, local and MassDEP requirements.

4. RAILROAD COORDINATION

A. Mass Coastal Railroad is engaged in the business of providing freight rail transportation services in Southeastern Massachusetts. Railroad will endeavor to operate its train service to provide track occupancy periods as long as practicable to facilitate efficient trackwork operations. The Operations Department, in conjunction with the Customer Service and Marketing Departments has prepared a Train Operations Schedule for project planning and scheduling which is included as part of the Contract Documents. In the event of a change, Railroad will work with Contractor to ensure sufficient work windows are available.

B. Daily meetings will be required between the on-site representatives of Contractor, Owner’s Authorized Representative and Railroad to ensure coordination of work activities and train service. During working hours, the track shall remain passable for scheduled freight train moves. All personnel, equipment and material shall be cleared and secured from the track, and all switches shall be normalized and properly lined up as directed by Railroad EIC. At the end of each shift: any in service track must meet FRA Class 2 criteria (Class 5 upon completion of a turnout); all personnel, equipment and materials shall be cleared and secured from the track, and all switches shall be normalized, in working order and secured as directed by Railroad EIC.

C. The protection of trains, overall safe operations and the protection of workmen and railroad personnel are paramount objectives in executing the Work. All personnel entering the Railroad Right-of-Way must have Roadway Worker Protection (RWP) training in accordance with MCRR's Roadway Worker Protection Manual and On-Track Safety Program.

5. WORK HOURS and NOISE CONTROL

A. Municipalities through which Mass Coastal Railroad operates have varying ordinances which control various activities such as work hours. While Railroad believes that the ICC Termination Act exempts railroad activities from local regulation, Railroad has adopted a "Good Neighbor Policy" and one element of that policy limits, to the extent consistent with efficiency and safety, early morning and late night operations. Accordingly, unless otherwise controlled or allowed by local ordinances, work shall not start before 6:30AM and shall end before 7:00PM daily. Work on weekends and Holidays is encouraged due to no train operations on those days.

B. Noise control is a part of Railroad's "Good Neighbor Policy" and includes many of the activities discussed above. Noise from trackwork operations shall be controlled to the extent possible, including the sounding of horns and warning devices on railway maintenance and construction machinery. Nothing set forth in this Section shall relieve Contractors from full compliance with FRA and Commonwealth regulations regarding sounding of horns, whistles and/or bells at crossings and approaching and passing through work zones.

6. RAILROAD PROVIDED SUPPORT SERVICES

A. Coordination of on-track safety protection for the Contractor and/or Subcontractor's personnel and equipment. Contractors will be provided the following required Railroad Support Services by Mass Coastal Railroad (Railroad) personnel:

1. Railway Worker Protection ("RWP") training will be provided by Railroad to each Contractor and/or Subcontractor employee on the Project site. RWP Training is mandatory and must be successfully completed prior to accessing the ROW. Contractor will be charged a nominal fee by Railroad for each worker trained in RWP. Contractor shall be responsible for all other costs incurred by workers related to the RWP training.

2. Daily onsite worker safety inspections by Railroad;

3. One full time Employee in Charge (EIC) and additional personnel as required supplied by Railroad for the duration of Contractor and/or Subcontractor's presence on site. The EIC will provide the following services to Contractor and/or Subcontractor:

   a. Daily Job Briefings at the beginning of each work day and anytime work conditions change.

   b. Coordination of on-track safety protection for Contractor and/or Subcontractor's personnel and equipment.

   c. Flagging of all train movements through Contractor and/or Subcontractor's work location.

   d. Flagging of all vehicles at highway crossings fouled by Contractor and/or Subcontractor's personnel and/or equipment; and

e. Daily end of work track inspections required to place track worked on by Contractor and/or Subcontractor back in service.

7. PROJECT OVERSIGHT

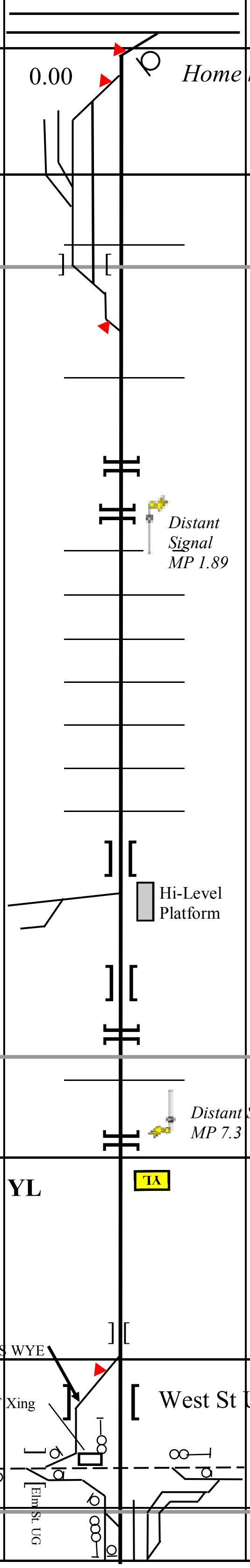
A. At least one full-time MassDOT representative will be present on-site for the duration of the project for the purpose of representing Owner's interests with regard to this project and will provide:

1. Oversight and Construction Inspection Services;
2. Act as a liaison between the Railroad and MassDOT;
3. Daily end of day employee production reporting.

END OF SECTION

Framingham Secondary

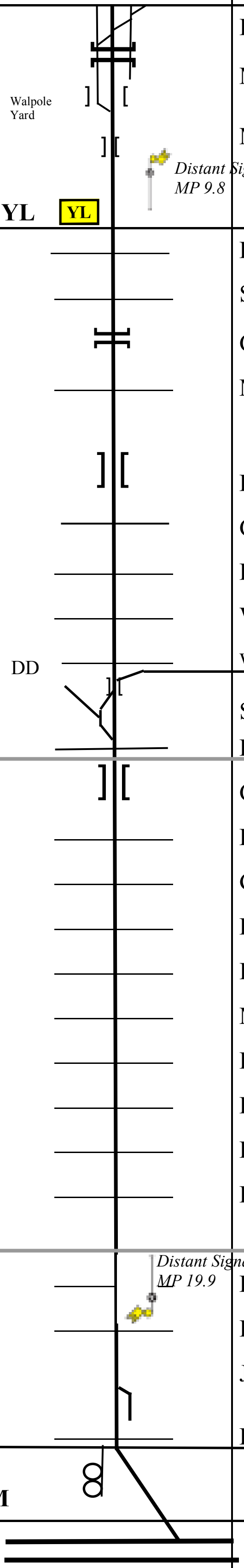
The direction from Mansfield to Framingham is North



Normal Speed PSGR	Normal Speed FRT	Milepost	Station	Track Diagram	Highway Grade Crossings and Bridges	Rules in Effect	Siding Length 50' cars
			AMTRAK NEC				
10	10	**0.10**	**MANSFIELD**	0.00	*Home Signal* *Begin MCRR Territory*	**98**	
10	10	0.50	Stream UG		Private Rd	**DCS**	*Mansfield*
			Mansfield Yard (0.90)				*Foxboro*
		1.07			Spring St F		
		1.77			I-95 OH Br North		
		1.80		*Distant Signal MP 1.89*	I-95 OH Br South		
		1.89			Elm St F		
		2.30			Leonard St F		
		2.67			Cocasset St F		
		2.81			Mechanic St F		
		2.90			Bird St F		
		3.49			Chesnut St F		
		4.20			North St F		
		4.33			Neponset River UG Br		
		4.90	**FOXBORO** Foxboro Term	Hi-Level Platform			
		5.19			Neponset River UG Br		
		5.29			Route 1 OH Br		*Foxboro*
		5.62			Summer St F		*Walpole*
		7.94		*Distant Signal MP 7.3*	Main St (Rte 1A) OH Br		
10	10	**8.00**	**SE WALPOLE**	**YL**	Neponset River UG	**DCS/93**	
		8.46		LEWIS WYE PVT Xing	West St UG Br	**NORAC INTL 600-616**	
		8.58	**LEWIS**				
		8.63		*Boston*	KEOLIS Franklin Branch		*Walpole*
		8.75	**WALPOLE**	Elm St UG			*Medfield*

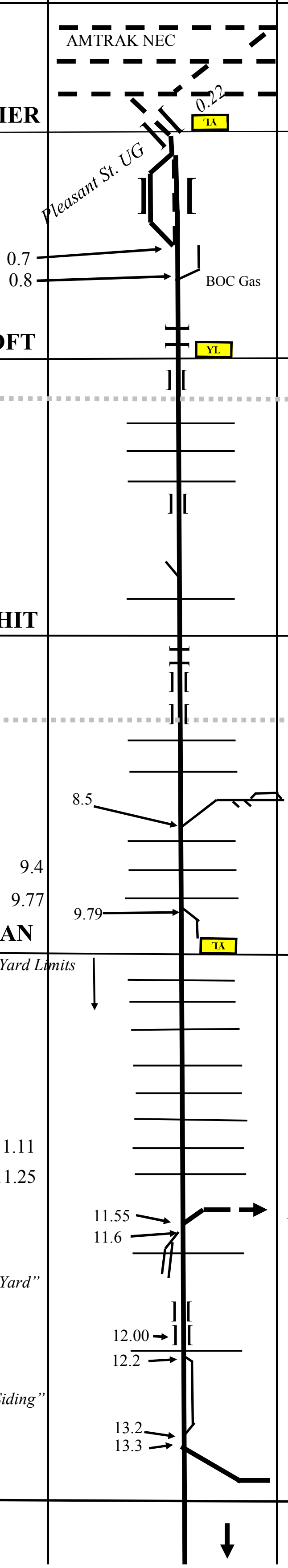
Framingham Secondary (*continued*)

The direction from Mansfield to Framingham is North

Normal Speed PSGR	Normal Speed FRT	Milepost	Station	Track Diagram	Highway Grade Crossings and Bridges	Rules in Effect	Siding Length 50' cars
10	**10**	8.83			Elm St OH Br		
		8.95		Walpole Yard	Mill Race UG Br		
		9.22			Mine Brook UG		
		10.00	**NE WALPOLE YL**	YL *Distant Signal MP 9.8*		**DCS/93**	
10	**10**	10.73			Private Crossing	**DCS**	
		11.48			South St G		
		11.85			Curve St OH Br		
		12.37			Main St G		
		12.40	**FIELD**				
		12.50			Friary St UG Br		
		12.59			Cottage St F		
		12.79			Dale St F		
		13.26			West St F		
		13.60	MEDFIELD JCT 13.70	DD	West Mill St F BCLR Millis Secondary		
		13.76			Sawmill Brook UG Br		
		14.79			Hospital Rd F		*Medfield*
		15.35			Charles River UG Br		*Sherborn*
		15.93			Forest St F		
		16.49			Goulding St F		
		17.23			Farm Rd F		
		17.55			Elendale Stables - Private		
		17.70			Main St - Washington F		
		18.05			Hunting Ln F		
		18.20			Farm Rd (Private)		
		18.65			Private Rd		
		18.78			Prospect St F		
		19.00					*Sherborn*
		19.81		*Distant Signal MP 19.9*	Farm Rd (Private)		*Framingham*
		20.34			Leland St F		
		20.75			Junk Yard (Private)		
10	**10**	21.03	*Begin MCRR Territory*		Blandin Ave F		
		21.04	**FRAMINGHAM**		*INT Signal*		
		WORCESTER MAIN LINE—KEOLIS					

Middleboro Subdivision

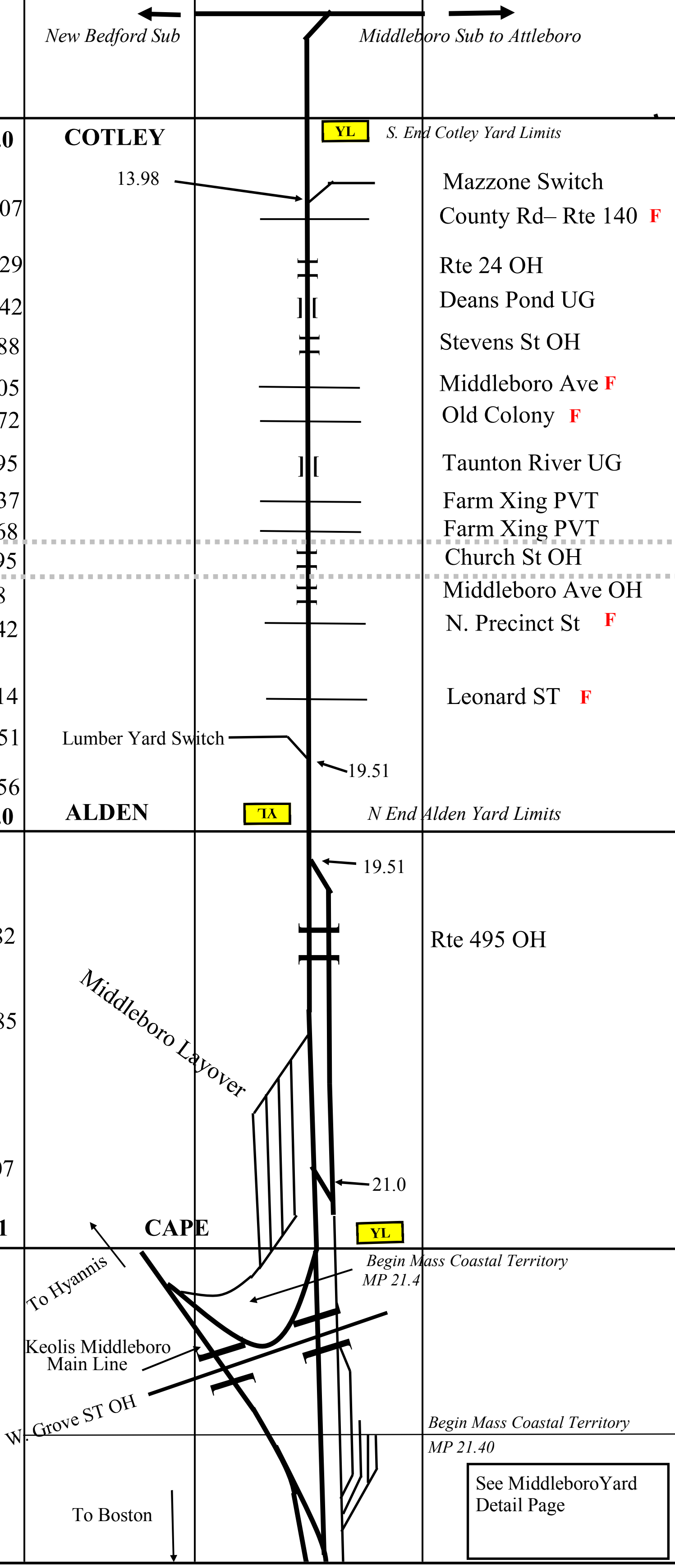
The direction from Currier to Cape is South



Normal Speed PSGR	Normal Speed FRT	Milepost	Station	Track Diagram South ↓	Highway Grade Crossings and Bridges	Rules in Effect	Siding Length 50' cars
		0.0	**CURRIER**			*Attleboro*	
10	**10**				*Begin Mass Coastal Territory*	**DCS/93**	55
		0.49			Forest St UG		
					Croft Yard Limits		
		1.93			Pike Ave OHB		
		2.0	**CROFT**				
30	**25**	2.35			Chartley Pond	*Attleboro*	
		2.83			Union Rd **F**	*Norton*	
		3.38			John Scott Blvd **F,G**	**DCS**	
		4.25			S.Worcester Street **F**		
		4.65			Wading River UG		
		5.75			Freezer Switch OOS		
		5.87			Woodward Street **F,G**		
		6.0	**WHIT**				
		6.64			Taunton Ave OH		
		6.69			Meadow Brook UG		
		6.84			Three Mile River UG	*Norton*	
		7.16			Harvey Street **F**	*Taunton*	
		7.81			S. Crane Ave **F**		
					Miles Standish I.T.		
30	**25**	8.6			Fremont Street **F**		
10	**10**	9.3	9.4		West Brittania Street **F**		
20	**20**	9.5	9.77		Danforth Street **F,G**		
					Taunton Siding	**DCS**	12
		10.0	**DEAN**				
10	**10**	10.2	*N. End Cotley Yard Limits*		Tremont Street **F,G**	**DCS/93**	
		10.47			Oak Street **F,G**		
		10.65			Porter Street **F,G**		
		10.75			Cohannet Street **F,G**		
		10.84			Winthrop Street **F,G**		
		10.97			Harrison Ave **F,G**		
15	**15**	11.10	11.11		Somerset Ave **F,G**		
		11.30	11.25		Weir Street **F,G**		
25	**25**				*Dean St I.T MCRR*		
		11.67			Ingell Street		
			"Weir Yard"				
		11.8			Taunton River UG		
		12.17			Bricky Rd UG Hart Street		
			"Cotley Siding"				68
		13.00					
10	**10**				Middleboro Subdivision →	**DCS/93**	
				↓	New Bedford Subdivision	**DCS/93**	

Middleboro Subdivision (*continued*)

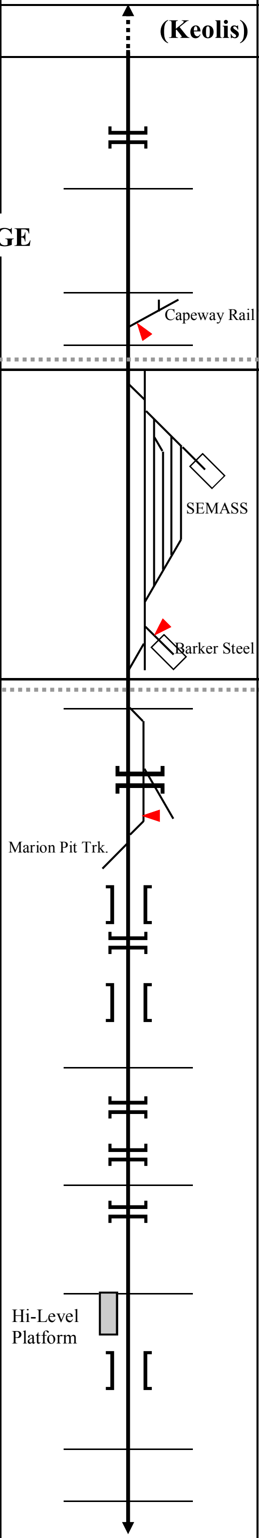
The direction from Cotley to Cape is South



Normal Speed PSGR	FRT	Milepost	Station	Track Diagram South	Highway Grade Crossings and Bridges	Rules in Effect	Siding Length 50' cars
10	10					DCS/93	
30	25	**14.0**	**COTLEY**		*S. End Cotley Yard Limits*		
					Mazzone Switch	DCS	
		14.07			County Rd– Rte 140 F		
		14.29			Rte 24 OH		
		14.42			Deans Pond UG		
		14.88			Stevens St OH		
		15.05			Middleboro Ave F		
		15.72			Old Colony F		
		15.95			Taunton River UG		
		16.37			Farm Xing PVT		
		16.68			Farm Xing PVT	*Taunton*	
		16.95			Church St OH	*Raynham*	
		17.8			Middleboro Ave OH	*Middleboro*	
		18.42			N. Precinct St F		
		19.14			Leonard ST F		
		19.51	Lumber Yard Switch				
		19.56					
		20.0	**ALDEN**		*N End Alden Yard Limits*	DCS	
20	20					DCS/93	
		20.82			Rte 495 OH		
		20.85					
		21.07				DCS/93	
		21.1	**CAPE**				
					Begin Mass Coastal Territory MP 21.4	98	
					Begin Mass Coastal Territory MP 21.40 See MiddleboroYard Detail Page		

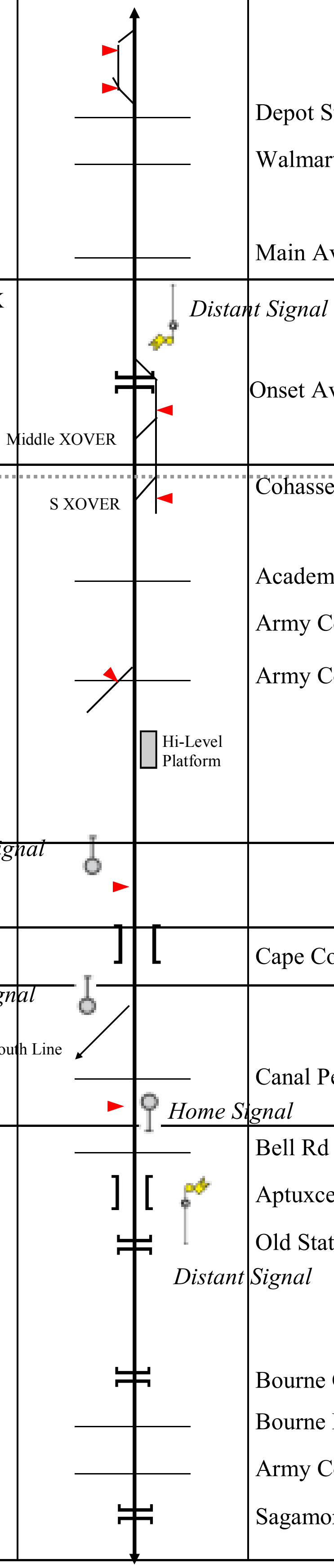
Cape Main

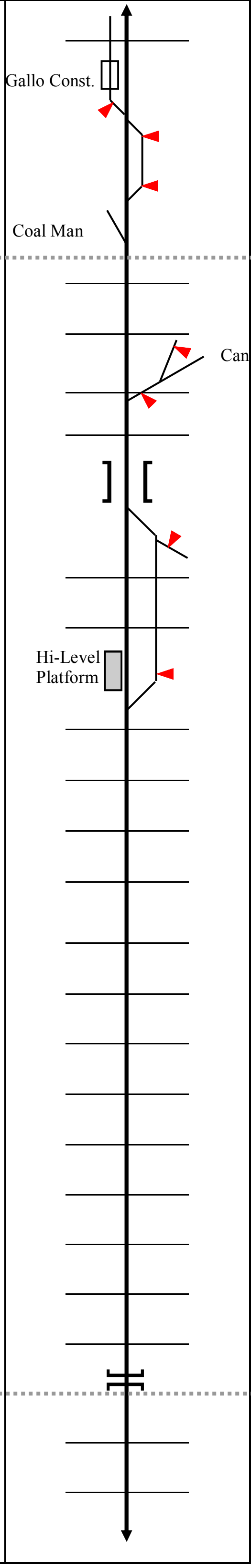
The direction from Bay to Hyannis is South.

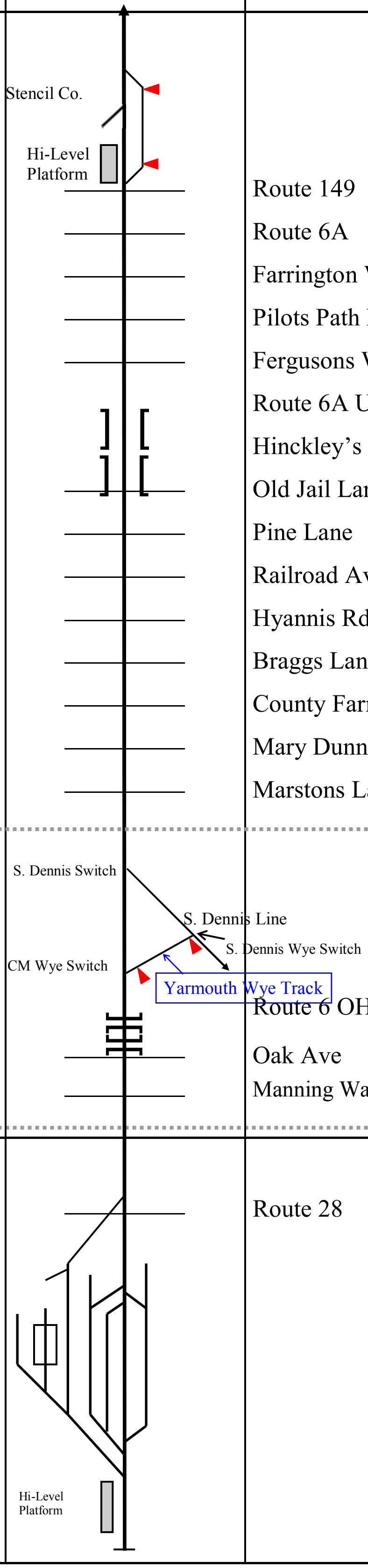


Normal Speed PSGR	Normal Speed FRT	Milepost	Station	Track Diagram	Highway Grade Crossings and Bridges	Rules in Effect	Siding Length 50' cars
				(Keolis)	(See Note 1)	**(562)**	
55	**30**	**36.30**	**BAY**			**DCS**	
		37.18			Cherry St. OH Br		
		39.51			Miller St **F, G**		
		41.00	**ROCK VILLAGE**				
		41.65			Spruce St **F, G**		
		43.40			Hells Blazes Pvt.	**DCS**	***Middleboro***
							Rochester
		44.0	**ROCHESTER**				
							Rochester
		44.87			County Rd **F, G**	**DCS**	***Wareham***
		45.38			Pierceville Rd OH Br		52 cars
		45.60	**TREMONT**				
		45.72			Tail Race Creek UG Br		
		46.24			Main St. OH Br		
		47.09			Main St. UG Br		
		47.19			Station St **F, G**		
		47.50			N Interstate 195 OH Br		
		47.54			S Interstate 195 OH Br		
		47.79			Hathaway Rd **F, G**		
		48.26			Main St. OH Br		
		48.35			Elm St **F, G**		
		49.30	**WAREHAM**				
		49.44			Wankinco River UG Br		
		49.47			Sandwich Rd/Route 6 **F, G**		
		49.89			Indian Neck Rd **F, G**		
55	**30**					**DCS**	

NOTE: Mass Coastal controlled CM track ends at Bay. Trains must not pass "Entering Signaled Territory" sign at Bay without authorization from the Keolis Old Colony Dispatcher.

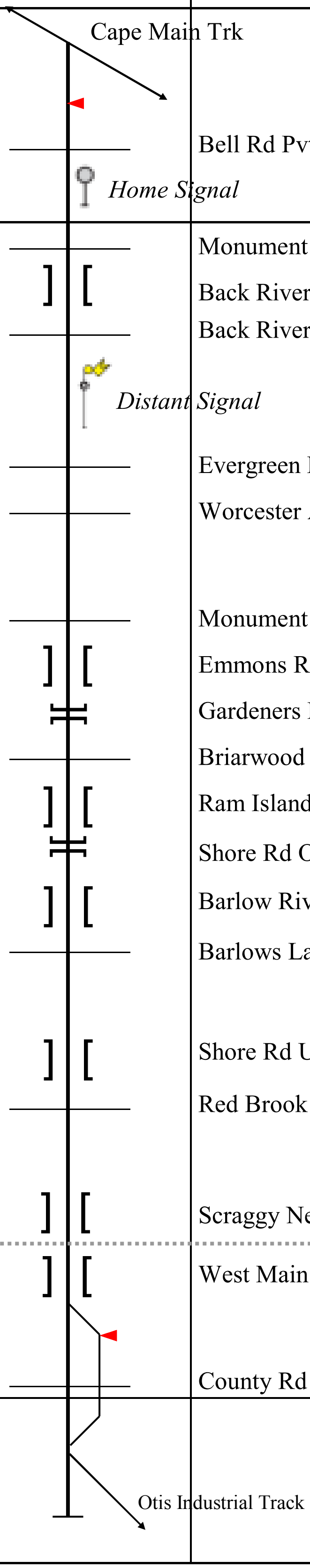
Normal Speed		Milepost	Station	Track Diagram	Highway Grade Crossings and Bridges		Rules in Effect	Siding Length 50' cars
PSGR	FRT							
55	**30**						**DCS**	
		50.30	**E WAREHAM**					13 cars
		51.29			Depot St	**F, G**		
		51.80			Walmart Pvt.			
		52.50	**ONSET**					
55	**30**	52.68			Main Ave	**F, G**	**DCS**	
30	**25**	**53.70**	**BUTTERMILK**				**DCS**	
		53.98			Onset Ave OH Br			28 cars
30	**25**	**54.20**	**TAYLOR**					*Wareham*
15	**10**	54.31			Cohasset Narrows UG Br			*Bourne*
		54.60			Academy Dr	**F,G**		
		54.62			Army Corp Track			
		54.70			Army Corps Pvt			
15	**10**	54.72	**BUZZARDS BAY**					
							DCS	
							INT	
10	**5**	54.84			Cape Cod Canal Movable Br			
		54.87			Canal Pedestrian	**F**		
10	**5**	**54.90**	**CANAL JCT**				**INT**	
30	**25**	54.91			Bell Rd Pvt.		**DCS**	
		55.43			Aptuxcet Rd UG Br			
		55.73			Old State Rd OH Br			
		56.00	**APTUXCET**					
		56.36			Bourne OH Br			
		56.37			Bourne Bridge Access Pvt.			
		57.80			Army Corps Pvt.			
30	**25**	59.54			Sagamore OH Br		**DCS**	

Normal Speed PSGR	 FRT	Milepost	Station	Track Diagram	Highway Grade Crossings and Bridges	Rules in Effect	Siding Length 50’ cars
30	**25**	59.55			Sagamore Br. Access Pvt.	**DCS**	
		59.70	**SAGAMORE**				41 cars
		60.55			Tank Farm Pvt.		*Bourne* *Sandwich*
		61.15			Canal Electric Pvt		
		61.26			Freezer Rd F, G		
		61.56			Town Neck Rd F, G		
		61.95			Mill Creek UG Br		
		62.09			Willow St F		
		62.17			Jarves St F, G		
		62.20	**SANDWICH**				17 cars
		62.28			Liberty St F		
		62.61			Dewey Ave F, G		
		63.10			Old Dump Rd Pvt.		
		63.37			Great Island Rd Pvt. F, G		
		63.56			Spring Hill Rd F		
		64.05			Lampi’s Bog Access Pvt.		
		64.35			Quaker Meetinghouse Rd F, G		
		64.91			Route 6A F, G		
		65.15			Atkins Rd F		
		65.59			Whites Crossing Pvt.		
		65.76			Old County Rd F		
		66.24			Game Preserve Pvt.		
		66.56			Talbots Point Pvt. F, G		
		66.95			Old County Rd OH Br		*Sandwich* *Barnstable*
		68.54			Maple St F, G		
		69.10			Willow St F		
30	**25**					**DCS**	

Normal Speed PSGR	Normal Speed FRT	Milepost	Station	Track Diagram	Highway Grade Crossings and Bridges	Rules in Effect	Siding Length 50' cars
30	25			 Stencil Co. Hi-Level Platform S. Dennis Switch S. Dennis Line S. Dennis Wye Switch CM Wye Switch Yarmouth Wye Track Hi-Level Platform		DCS	
		69.40	**WEST BARNSTABLE**				12 cars
		69.42			Route 149 F, G		
		69.95			Route 6A F, G		
		71.18			Farrington Way Pvt.		
		71.25			Pilots Path Pvt.		
		71.73			Fergusons Way Pvt.		
		72.00			Route 6A UG Br		
		72.10			Hinckley's Cowpass UG Br		
		72.69			Old Jail Lane F,G		
		72.92			Pine Lane F		
		72.99			Railroad Ave Pvt.		
		73.25			Hyannis Rd F, G		
		73.57			Braggs Lane F, G		
		73.90			County Farm Pvt.		
		74.15			Mary Dunn Rd F,G		
		75.28			Marstons Lane F, G		*Barnstable* *Yarmouth*
		75.50	**YARMOUTH JUNCTION**				Wye: 3
		76.35			Route 6 OH Br		
		76.85			Oak Ave F, G		
		77.30			Manning Way Pvt. (Airport Access)		
30	25					DCS	*Yarmouth* *Barnstable*
REST	**REST**	**78.00**	**PORT**			98	
		78.50			Route 28 F, G		
REST	**REST**	**79.0**	**HYANNIS**			98	

Falmouth Line

The direction from Canal Jct. to Otis is South.



Normal Speed		Milepost	Station	Track Diagram	Highway Grade Crossings and Bridges	Rules in Effect	Siding Length 50' cars
PSGR	**FRT**						
10	**10**					**INT**	
		0.40			Bell Rd Pvt.		
10	**10**	**0.41**	**CANAL JCT**			**INT**	
30	**25**	0.82			Monument Neck Rd **F**	**DCS**	
		1.18			Back River UG Br		
		1.20			Back River Pvt.		
		1.57			Evergreen Hill Rd Pvt		
		1.79			Worcester Ave **F**		
		1.90	**MONUMENT BEACH**				
		2.11			Monument Beach Pvt. **F, G**		
		2.29			Emmons Rd UG Br		
		2.36			Gardeners Rd OH Br		
		2.80			Briarwood Lane Pvt.		
		2.86			Ram Island UG Br		
		3.10			Shore Rd OH Br		
		3.30			Barlow River UG Br		
		3.60			Barlows Landing Rd **F**		
		3.70	**POCASSET**				
		4.58			Shore Rd UG Br		
		4.87			Red Brook Harbor Rd **F**		
		5.60	**CATAUMET**				
		5.51			Scraggy Neck Rd UG Br		
							Bourne *Falmouth*
		6.26			West Main St UG Br		
30	**25**						24 cars
		6.80			County Rd **F, G**		
10	**10**						
		6.80	**OTIS**				
						DCS	

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

GENERAL CONDITIONS

1. ARTICLE 1 - DEFINITIONS:

Wherever used in the Contract Documents the following terms, or pronouns in place of them, are used, the intent and meaning, unless a different intent or meaning is clearly indicated, shall be interpreted as set forth below.

The titles and headings of the Sections, Subsections and Articles herein are intended for convenience of reference and shall not be considered as having bearing on their interpretation.

Terms not defined below shall have their ordinary accepted meanings within the context which they are used. “Webster’s Third New International Dictionary of the English Language, Edition 3, Unabridged, Copyright 2002”, or subsequent revision thereof, shall provide ordinarily accepted meanings. Words which have a well-known technical or trade meaning when used to describe Work, materials or equipment shall be interpreted in accordance with such meaning.

Addenda: All clarifications, corrections, or changes issued graphically or in writing by Owner after the Notice to Bidders but prior to the opening of Bids.

Application for Payment: The form provided by Owner which is used by Contractor in requesting progress or final payments and which is to include such supporting documentation as is required by the Contract Documents.

Approved or Approval: Means written approval by Owner or Owner’s Authorized Representative.

Award: The acceptance by Owner of the successful Bid.

Bid: The offer of a Bidder, on the prescribed form(s) to perform the Work in accordance with the Contract Documents at the prices quoted.

Bidder: Any individual, firm, corporation or any acceptable combination thereof, or joint venture submitting a Bid for the Work. **Bid Documents:** Specifications and Plans provided to prospective bidders for their use in developing their bid on the Project. Specifications documents include Notice to Bidders, Project Description, Scope of Work, Project Bid Schedule, Bid Form, Change Order Form, Train Operations Schedule, Technical Specifications, Special Conditions, General Conditions, Schedule of Prevailing Wage Rates, Track Chart, Roadway Worker Protection Manual and On-Track Safety Program of the Railroad, Environmental Permits, Plans and other supporting documents included with the Project.

ARTICLE 1 – DEFINITIONS (continued)

Calendar Day: Every day shown on the calendar, beginning and ending at midnight.

Change Order: A written order by Owner or its Authorized Representative directing changes to the Contract within its general scope.

Conditions of the Contract: Those portions of the Contract Documents which define the rights and responsibilities of the contracting parties and of others involved in the Work. The Conditions of the Contract include General Conditions, Special Conditions and any other Conditions specified in the Notice to Bidders, and any Addenda thereto.

Consultant: A person, firm, agency or corporation retained by Owner or Railroad to prepare Contract Documents, perform construction administration services, inspect the Work, or perform other Project related services. A Consultant (including but not limited to engineers, architects, testing laboratories, and surveyors) may also be retained by Contractor or Bidder for services necessary for the completion of the Work.

Contract: The written and duly executed agreement between Owner and Contractor setting forth the obligations of the parties, including the Work and the basis of payment, as authorized by Owner. The Contract includes the Contract Documents and represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral.

Contract Amount: The total amount set forth in the executed Contract between Owner and Contractor, based on the successful bid for the Project, as adjusted by any Change Order or Contract amendments, and as further defined in the General Conditions.

Contract Documents: The Contract form, Addenda thereto, the Bid Documents (including the Specifications and Plans), Contractor's Bid (including all appropriate bid tender forms), and all other Contract documents and other supporting documentation furnished by Owner to Contractor, together with all Change Orders and documents approved by Owner for inclusion, modifications and supplements issued on or after the Effective Date of the Contract. The Specifications include Notice to Bidders, Project Description, Scope of Work, Project Bid Schedule, Bid Form, Change Order Form, Train Operations Schedule, Technical Specifications, Special Conditions, General Conditions, Schedule of Prevailing Wage Rates, Track Chart, Roadway Worker Protection Manual and On-Track Safety Program of Railroad, Environmental Permits, and Plans.

Contractor: The individual, firm, partnership, corporation, or combination thereof, private, municipal or public, including joint ventures, which, as an independent contractor, has entered into a Contract with Owner (as defined herein) to perform the Work, and who is referred to throughout the Contract Documents by singular number.

Contract Schedule or Project Schedule: The Project schedule or construction schedule for the Project prepared by Contractor in conformance with the provisions of the Contract Documents and submitted to Owner for approval.

ARTICLE 1 – DEFINITIONS (continued)

Contract Time: The number of Calendar Days or the date specified in the Contract or Contract Schedule and authorized time extensions which identify how much time Contractor is allowed to achieve Final Completion as further defined in the General Conditions.

Cost of the Work: The sum of all costs actually incurred and necessary to carry out the Work and paid by Contractor in the proper performance of the Work, as further defined in the General Conditions.

Defective: An adjective which refers to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to Owner's approval of final payment.

Directive: A written communication to Contractor from Owner or Owner's Authorized Representative(s) interpreting or enforcing a Contract requirement or ordering commencement and/or cessation of an item of Work.

Drawings or Plans: The drawings which show the character and scope of the Work to be performed and which have been furnished by Owner and are made a part of the Contract Documents.

Effective Date of the Contract: The date on which the Contract is fully executed by both Contractor and Owner.

Final Completion: The Work (or specified part thereof) progressed to the point that all Work is complete, including final acceptance/commissioning, as determined by Owner.

Final Contract Amount: The total amount upon Final Completion of the Project based on Contractor's Bid, as adjusted by any Change Order or Contract amendments.

General Requirements: Sections of the Contract Documents which contain administrative and procedural requirements as well as requirements for temporary facilities.

Holidays: Owner recognizes the following Holidays:

New Year's Day - January 1
Martin Luther King Day – Third Monday in January
Presidents Day – Third Monday in February
Patriot's Day – Third Monday in April
Memorial Day - Last Monday in May
Independence Day - July 4
Labor Day - First Monday in September
Columbus Day – Second Monday in October
Veterans Day – November 11
Thanksgiving Day - Fourth Thursday in November
Christmas Day - December 25

ARTICLE 1 – DEFINITIONS (continued)

If any holiday listed above falls on a Saturday, Saturday and the preceding Friday are both considered as holidays. If the holiday should fall on a Sunday, Sunday and the following Monday are both considered as holidays.

Initial Contract Amount: The total amount set forth in the executed Contract between Owner and Contractor, based on the successful bid for the Project.

Install: Means to build into the Work, ready to be used in complete and operable condition and in compliance with the Contract Documents.

Legal Requirements: All laws, rules, regulations, ordinances, codes and/or orders applicable to the Contract Work, including the Work's impact upon Railroad's operations.

Lump Sum Work: Work to be paid for on the basis of a single lump sum price bid for a specific item of work.

Notice of Award: The written notice by Owner to all Bidders identifying the successful Bidder and establishing Owner's intent to execute the Contract when all conditions required for execution of the Contract are met.

Notice to Bidders, Request for Bid or Invitations for Bids: The announcement inviting Bids for Work to be performed and/or materials to be furnished.

Notice to Proceed: A written notice by Owner to Contractor to begin the Work and establishing the date on which the Contract Time begins in accordance with the Contract Documents.

Owner: The Massachusetts Department of Transportation ("**MassDOT**"). Owner shall have the power to exercise the rights, responsibilities, authorities and functions vested in Owner, by virtue of Owner's ownership of the railroad property on which the Work shall be performed, and by virtue of certain contracts between Owner and Railroad, including, without limitation, the Owner / Railroad Agreements.

Owner Contract Manager: The person authorized to administer the Contract on behalf of Owner, who has authority to make findings, determinations and decisions with respect to the Contract and, when necessary, to modify or terminate the Contract. The Owner Contract Manager for this Contract shall be Chalita Belfield, Director of Railroad Properties for MassDOT or, in her absence, James L. Eng, Deputy Rail Administrator for MassDOT.

Owner / Railroad Agreements: Written contracts between Owner and Railroad, including, without limitation, a certain License and Operating Agreement dated September 26, 2007 (as amended), a certain Services Contract dated October 23, 2015 (as amended), and other contracts duly executed by Owner and Railroad which pertain to the Contract Work, or the safety, regulatory compliance and operation of the railroad right-of-way, track and related facilities where the Work will take place. The Owner / Railroad Agreements may change from time to time during the term of the Contract, and Owner shall notify Contractor in writing of such changes.

ARTICLE 1 – DEFINITIONS (continued)

Owner's Authorized Representative(s): Person(s) designated in writing by Owner as authorized to oversee the construction of the Project in the field and to represent the interests of Owner, subject to the written determinations and authority of Owner.

Project: The total construction, of which the Work performed under the Contract Documents, is the whole or a part.

Project Bid Schedule: Document provided as part of the Bid Documents outlining the schedule for the bid phase of the project, including date, times and locations, as applicable, for pre-bid meeting; contractor questions; Owner responses; bid due date; bid opening date; and contract authorization.

Railroad: The railroad which is responsible for the safety and regulatory compliance of Owner's railroad right-of-way, track and related facilities where the Work will take place. Currently, the Railroad is Massachusetts Coastal Railroad, LLC ("**MCRR**" or "**Mass Coastal Railroad**"). Owner shall notify Contractor in writing upon any change to the identity or description of Railroad during the term of the Contract. The term "Railroad", when used in the text of these General Conditions or other Contract Documents, shall also mean any duly authorized representative of Railroad when authorized in accordance with these General Conditions.

Railroad's Authorized Representative(s): Person(s) designated in writing by Railroad as authorized representative(s), who are authorized to make findings, determinations and decisions on behalf of Railroad.

Shop Drawings: All Drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier and submitted by Contractor to illustrate material, equipment, fabrication, or erection for some portion of the Work.

Subcontractor: An individual, firm, or corporation to whom Contractor sublets part of the Contract. However, Contractor remains responsible for the Work.

Substantial Completion: The Work shall be Substantially Complete when either (a) the Work required by the Contract has been completed, except for Work having a cost of less than one percent (1%) of the then-adjusted total Contract Amount, or (b) substantially all of the Work has been completed and available for use except for minor incomplete or unsatisfactory Work items that do not materially impair the usefulness of the Work required by the Contract. The terms "Substantially Complete" and "Substantially Completed" as applied to any Work refer to Substantial Completion thereof.

Technical Specifications: Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative and procedural details applicable thereto.

Time and Material Work: Work to be paid for on the basis of actual labor expended and actual cost of furnishing and incorporating material into the Project.

Unit Price Work: Work to be paid for on the basis of unit prices bid for specific items of work, as further defined in the General Conditions.

Work: The act of, and the result of, performing services, furnishing labor, furnishing and incorporating materials and equipment into the Project, and performing other duties and obligations, all as required by, and in compliance with, the Contract Documents. Such Work, however incremental, will culminate in the entire completed Project, or the various separately identifiable parts thereof.

2. ARTICLE 2 – AUTHORITIES AND LIMITATIONS:

2.1 RAILROAD'S AUTHORITY AND LIMITATIONS:

2.1.1 Railroad is responsible for the safety and regulatory compliance of Owner's railroad right-of-way, track and related facilities where the Work will take place, and shall have the authority to exercise its rights and obligations pursuant to the Owner / Railroad Agreements and applicable statutes, regulations and ordinances with respect to the Work.

2.1.2 Railroad (and Owner) shall have the right to review and approve the proposed Project Schedule.

2.1.3 All track outages shall require the prior approval of Railroad (and Owner).

2.1.4 Railroad shall have the right to enter upon the Work site, to inspect the Work and related materials and equipment for compliance with the Contract Documents and applicable safety requirements.

2.1.5 Railroad will provide flagpersons and Engineers-In-Charge (EICs) as required for the performance of the Work.

2.2 EVALUATION BY OWNER

2.2.1 Owner will decide all questions which may arise as to:

- 2.2.1.1 Quality and acceptability of materials furnished;
- 2.2.1.2 Quality and acceptability of Work performed;
- 2.2.1.3 Compliance with the Project Schedule;
- 2.2.1.4 Interpretation of Contract Documents; and
- 2.2.1.5 Acceptable fulfillment of the Contract on the part of Contractor.

2.3 MEANS & METHODS

2.3.1 The means, methods, techniques, sequences or procedures of construction, or safety precautions and the program incident thereto, and the failure to perform or furnish the Work in accordance with the Contract Documents are the sole responsibility of Contractor.

2.4 SITE VISITS AND INSPECTIONS

2.4.1 Railroad and Owner and their representatives may make visits to the site(s), any off-site fabrication sites and approved remote storage sites at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents.

2.4.2 Such observations or the lack of such observations shall in no way relieve Contractor from its duty to perform the Work in accordance with the Contract Documents.

ARTICLE 2 – AUTHORITIES AND LIMITATIONS (continued)

2.5 OWNER'S AUTHORITY AND LIMITATIONS

2.5.1 Owner alone shall have the power to exercise the rights, responsibilities, authorities and functions vested in Owner, by virtue of Owner's ownership of the railroad property, including the real property and improvements thereon, and by virtue of the Owner / Railroad Agreements.

2.5.2 Owner and its representatives shall have the right to enter upon the Work site, to inspect the Work and related materials and equipment for compliance with the Contract Documents and Owner's requirements, and to otherwise exercise Owner's rights with respect to the railroad property, improvements thereto, the Owner / Railroad Agreements, and the Project.

2.5.3 Contractor shall perform the Work in accordance with any written order (including but not limited to instruction, directive, interpretation or determination) issued by Owner or Owner's Authorized Representative(s).

2.5.4 Contractor assumes all the risk and consequences of performing the Work in accordance with any order (including but not limited to instruction, direction, interpretation or determination) of anyone not authorized to issue such order, and of any order not in writing.

2.5.5 Owner's rights hereunder shall survive the termination or expiration of the Contract.

3. ARTICLE 3 – CONTRACT DOCUMENTS - INTENT, AMENDING:

3.1 INCOMPLETE CONTRACT DOCUMENTS

3.1.1 The execution of the Contract by Contractor is considered a representation that Contractor has examined the Contract Documents to make certain that all sheets and pages of plans and specifications were provided and that Contractor is satisfied as to the conditions to be encountered in performing the Work.

3.1.2 Owner expressly denies any responsibility or liability for a Bid submitted on the basis of an incomplete set of Contract Documents.

3.2 COPIES OF CONTRACT DOCUMENTS

3.2.1 Owner shall furnish to Contractor up to two copies of the Contract Documents.

3.3 SCOPE OF WORK

3.3.1 The Contract Documents comprise the entire Contract between Owner and Contractor concerning the Work.

3.3.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the current practices regarding the Work of the Project. If a conflict or question arises within the Contract Documents, the Program Manager's interpretation will govern.

3.4 INTENT OF CONTRACT DOCUMENTS

3.4.1 It is the intent of the Contract Documents to describe a functionally complete Project to be constructed in accordance with the Contract Documents.

3.4.2 Any work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied, without any adjustment in Contract Amount or Contract Time, whether or not specifically called for.

ARTICLE 3 – CONTRACT DOCUMENTS – INTENT, AMENDING (continued)

3.4.3 Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the requirements of any governmental authority, whether such reference be specific or by implication, shall mean the edition stated in the Contract Documents or, if not stated, the latest standard specification, manual, code or requirements in effect at the time of advertisement for the Project (or, on the Effective Date of the Contract if there was no advertisement).

3.4.4 However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be deemed to change the duties and responsibilities of Contractor, or any of its subcontractors, agents or employees from those set forth in the Contract Documents, nor shall it be deemed to assign to Owner, Railroad, or any of Owner's or Railroad's Consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Sections 2.1 through 2.5.

3.4.5 Unless otherwise specified in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Any question or conflict in regard to interpretation will be resolved by Owner or Owner's Authorized Representatives.

3.5 DISCREPANCY IN CONTRACT DOCUMENTS

3.5.1 Before undertaking the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures, and dimensions shown thereon and all applicable field measurements.

3.5.2 Work performed in an area by Contractor shall imply verification of figures, dimensions and field measurements for that particular area of Work.

3.5.3 If, during the above study or during the performance of the Work, Contractor finds a conflict, error, discrepancy or omission in the Contract Document, or a discrepancy between the Contract Documents and any standard specification, manual, code, regulatory requirement or other Legal Requirement which affects the Work, Contractor shall promptly report such discrepancy in writing to Owner.

3.5.4 Contractor shall obtain a written interpretation or clarification from Owner before proceeding with any Work affected thereby.

3.5.5 However, Contractor shall not be liable to Owner for failure to report any conflict, error or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof or should reasonably have known thereof.

3.6 DISCREPANCY – ORDER OF PRECEDENCE

3.6.1 When conflicts, errors, or discrepancies within the Contract Documents exist, the order of precedence from most governing to least governing will be as follows:

- 3.6.1.1 General Conditions
- 3.6.1.2 Scope of Work
- 3.6.1.3 Technical Specifications
- 3.6.1.4 Special Conditions

3.6.2 Contractor shall not take advantage of any apparent error or omission in the Contract Documents. If Contractor discovers an error or omission, Owner shall be promptly notified. Owner will make corrections and interpretation as necessary to fulfill the intent of the Contract.

ARTICLE 3 – CONTRACT DOCUMENTS – INTENT, AMENDING (continued)

3.7 CLARIFICATIONS AND INTERPRETATIONS

3.7.1 Owner, directly or through its Authorized Representative(s), will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents to Contractor as Owner may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

3.7.2 Owner, directly or through its Authorized Representative(s), will make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, promptly and, in any event, no later than thirty (30) days after the written submission for the decision; but if such decision requires extended investigation and study, Owner or its Authorized Representative(s) shall, within thirty (30) days after receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty (30) day period and the date by which the decision will be made.

4. ARTICLE 4 – LANDS AND PHYSICAL CONDITIONS:

4.1 VISIT TO SITE

4.1.1 The execution of the Contract by Contractor is considered a representation that Contractor has visited and carefully examined the site and is satisfied as to the conditions to be encountered in performing the Work and as to the requirements of the Contract Documents.

4.2 UTILITIES

4.2.1 Contractor shall have full responsibility for:

- 4.2.1.1 Reviewing and checking all information and data concerning utilities.
- 4.2.1.2 Contacting DigSafe (811) at least 72 hours, exclusive of Saturdays, Sundays or holidays, but not more than thirty (30) days prior to the commencement of any excavation or removal of earth activities within private ways or public property, to have utilities locate and mark any underground facility within the proposed work area.
- 4.2.1.3 Locating all underground utilities shown or indicated in the Contract Documents which are affected by the Work.
- 4.2.1.4 Coordination of the Work with the owners of all utilities during construction.
- 4.2.1.5 Safety and protection of all utilities.
- 4.2.1.6 Repair of any damage to utilities resulting from the Work.

5. ARTICLE 5 – INSURANCE:

5.1 INSURANCE REQUIREMENTS

5.1.1 In addition to any other forms of insurance or bonds required under the Contract, and except to the extent that any of the requirements of this Article are expressly waived in writing by Owner , Contractor shall, at its sole cost and expense, obtain, carry and maintain throughout the life of this Contract, insurance not less than the amounts and coverage herein specified, and Owner, Railroad and others identified herein shall be named as an additional named insureds under the insurance coverage so specified, with respect to the performance of the Work. Provided, however, that Owner need not be an additional insured on the Railroad Protective Liability insurance policy referenced herein.

5.1.2 There shall be no right of subrogation against Owner, Railroad or their agents performing work in connection with the Work, and this waiver of subrogation shall be endorsed upon the policies.

5.1.3 Insurance shall be placed with the companies licensed to do business in the Commonwealth of Massachusetts and these policies providing coverage there under shall contain provisions that no cancellation or material changes in the policy shall become effective except upon thirty (30) days prior written notice thereof to Owner, Railroad and any other additional or co-insureds.

5.1.4 Prior to commencement of the Work, Contractor shall furnish certificates to Owner, in duplicate, evidencing that the insurance policy provisions required hereunder are in force.

5.1.5 Acceptance by Owner of deficient evidence of insurance does not constitute a waiver of Contract insurance requirements.

5.1.6 Contractor shall furnish Owner with certified copies of policies upon request. The minimum coverages and limits required are as follows:

5.1.6.1 Worker’s Compensation insurance in accordance with the statutory coverages required by the Commonwealth of Massachusetts and Employers’ Liability insurance with limits not less than One Million Dollars ($1,000,000) for bodily injury by accident, each accident; One Million Dollars ($1,000,000) for bodily injury by disease, policy limit; and One Million Dollars ($1,000,000) for bodily injury by disease, each employee, and, where applicable, insurance in compliance with any other statutory obligations.

5.1.6.2 Public Liability or Commercial General Liability insurance with limits not less than Two Million Dollars ($2,000,000) per occurrence and Six Million Dollars ($6,000,000) aggregate for Bodily Injury and Property Damage, including coverage for Premises and Operations Liability, Products and Completed Operations Liability, Contractual Liability, Broad Form Property Damage Liability and Personal Injury Liability. Coverage shall not contain any exclusions of Explosion, Collapse, or Underground conditions. An umbrella policy may be utilized to satisfy the required limits of liability under this section.

5.1.6.3 Commercial Automobile Liability on all owned, non-owned, hired and rented vehicles used in connection with the work to be performed hereunder, with limits of liability of not less than Two Million Dollars ($2,000,000) Combined Single Limit for Bodily Injury and Property Damage per each accident or loss.

ARTICLE 5 – INSURANCE (continued)

5.1.6.4 Railroad Protective Liability Insurance (ISO-RIMA FORM) with a limit of not less than Five Million Dollars ($5,000,000) per occurrence, combined single limit for bodily injury and/or property damage, for all damages arising out of bodily injuries to or death of all persons and for damage to or destruction of property, including the loss of use thereof. Such insurance shall also contain an aggregate of not less than Ten Million Dollars ($10,000,000) for damages arising out of more than one occurrence. Contractor shall also provide a certified copy of the Railroad Protective Liability Insurance policy to Railroad upon request.

5.1.6.5 If Work involves use of watercraft, Protection and Indemnity insurance with limits not less than $5,000,000 per occurrence. Hull and Machinery coverage is to be carried on the vessel for the full current market value. This coverage requirement may be waived at the discretion of Owner if Contractor self-insures the equipment and will waive all rights of recovery against Owner and Railroad in writing.

5.1.6.6 Where applicable, Professional Liability insurance with limits of not less than $1,000,000 per claim and $2,000,000 aggregate, subject to a maximum deductible $10,000 per claim.

5.1.7 All insurance policies as described above are required to be written on an “occurrence” basis. In the event occurrence coverage is not available, Contractor agrees to maintain “claims made” coverage for a minimum of two years after the date of Final Completion of the Project.

5.1.8 In the event of loss or damage to Owner’s real property or improvements thereto which is caused by the act or omission of Contractor or its agents, insurance payments shall be made to the Commonwealth of Massachusetts or MassDOT, at Owner’s election, and Owner shall also reimburse Railroad from the proceeds of such payments for appropriate, documented costs incurred by Railroad in repairing such damage.

5.1.9 Contractor must provide certificates of insurance or other evidence of insurance that Owner may require as a condition of Award, and must maintain all insurance policies as set forth herein throughout the Contract and any applicable completed operations coverage. Failure to provide and maintain the insurance as required herein shall be a material breach of the Contract and shall operate to immediately cancel and terminate the Contract.

5.1.10 All insurance policies required herein shall be primary and non-contributory with any insurance or self-insurance maintained by Owner and any such third parties as Owner shall reasonably designate.

5.1.11 All insurance policies required herein shall provide no cancellation or material change in coverage, whether by insurer or insured, shall be valid unless written notice thereof is given directly to Owner at least thirty (30) days prior to the intended effective date thereof, which date shall be expressed in said notice. Notice of cancellation sent by the applicable insurer or insured to Owner by certified mail, postage prepaid, with a return receipt of the addressee required, shall be sufficient notice. All such insurance shall include a cancellation endorsement with Owner scheduled.

5.1.12 Contractor shall pay all deductibles and self-insured retentions applicable to any claims under any of the insurance coverages herein.

5.1.13 Nothing contained in this Section 5.1 shall limit Contractor's liability or the availability of its insurance for damage or injury, including death, or any other claim which arises out of or relates to any actions, omissions, or obligations.

5.1.14 Contractor shall waive all rights against Owner and its agents, officers, directors and employees for the recovery of damages to the extent such damages are covered by the insurance described herein.

5.1.15 The following parties shall be additional named insureds on all policies of insurance, unless otherwise indicated:

Massachusetts Department of Transportation (MassDOT)
Massachusetts Bay Transportation Authority (MBTA);
Keolis Commuter Rail Services, LLC; and
Massachusetts Coastal Railroad, LLC (MCRR); and
CSX Corporation

5.2 NOT USED

5.3 NOT USED

5.4 NOT USED

ARTICLE 5 – INSURANCE (continued)

5.5 INDEMNIFICATION

5.5.1 Contractor shall be responsible for and shall indemnify, defend and hold harmless Owner and the officers, directors, employees, agents (including Consultants) and subsidiary agencies of Owner (including, without limitation, the MBTA), Railroad (including Railroad's parent companies, affiliates, and subsidiaries), Keolis Commuter Services, LLC, and CSX Corporation, (hereinafter "Indemnified Party or Parties"), from and against any and all suits, claims, proceedings, liabilities, losses damages, charges and expenses (including attorneys' fees and experts' fees) of every name and nature ("Claims"), based on or arising out of any actual or alleged loss or injury (including death) to persons, or damage to real or tangible property that are caused or alleged to be caused, in whole or in part, or to arise out of the acts or omissions of, the Contractor or its employees, subcontractors, or agents.

5.5.2 Contractor being bound by all applicable state and federal regulations hereby expressly agrees to indemnify and hold harmless Owner for, from and against all audit exceptions and denials of reimbursement arising from Contractor's violation of the terms and conditions of state and federal laws. The Contractor shall make restitution to the Owner of such amounts of money as are withheld from the Owner by state, federal, county or local agencies or organizations due to the Contractor's noncompliance with applicable state and federal law, provided that in the event of any claim for such restitution, the Owner provides the Contractor with written notice of such claim and allows the Contractor to contest such claim. The Contractor shall make restitution to the Owner no later than sixty (60) days after receipt of notification from Owner that monies are due to the Owner.

5.5.3 The Owner agrees to notify the Contractor in writing within a reasonable period of time of the assertion of any Claim for which the Contractor has agreed to indemnify the Owner pursuant to sections 5.5.1 and/or 5.5.2 (the "Indemnified Claim"). If the Owner decides to itself conduct the defense of an Indemnified Claim or to conduct any other response itself, the Contractor shall reimburse the Owner for all reasonable costs and expenses (including without limitation, reasonably attorneys' and experts' fees and expenses) incurred by the Owner in connection with the Owner's defense of the Indemnified Claim and/or the conduct of all response actions. If the Owner decides to have the Contractor defend the Indemnified Claim or handle the response action, the Owner shall notify the Contractor of that decision in writing. In such instances, the Contractor shall bear the entire cost thereof and shall have sole control of the defense of any Indemnified claim and all negotiations for its settlement or compromise, provided that the Owner is fully indemnified by the Contractor and that the settlement or compromise shall not include the admission of guilt or comparable plea, wrongdoing or negligence, the permitting or imposition of civil or criminal penalties or indictments, the entering of consent decrees or orders of any kind by or against the Owner, or any other action that would prejudice the rights of the Owner, without the Owner's express written approval. The Owner shall cooperate with the Contractor in the defense of any Indemnified Claim.

5.5.4 If the Owner reasonably incurs any fees for attorneys or experts, or any other costs or expenses, to enforce its right to indemnification as set forth in this section 5.5, the Contractor shall fully indemnify and reimburse the Owner for such fees, costs and expenses.

5.5.5 Without limiting the generality of the foregoing, it is the clear intent of the Parties that the Indemnified Parties be indemnified and defended for any and all products liability, strict liability or strict products liability and/or the negligence of an Indemnified Party.

5.5.6 Contractor will be solely responsible for any and all claims for damage to underground structures such as, but not restricted to, water or gas mains, pipes, conduits, manholes or catch basis, due to his operation or to the operations of his Subcontractors.

5.5.7 Furnishing of insurance by Contractor as required herein shall not limit Contractor's liability hereunder, but shall be additional security therefore.

6. ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES:

6.1 SUPERVISION OF WORK

6.1.1 Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

6.1.2 All Work under this Contract shall be performed in a skillful and workmanlike manner. Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction.

6.1.3 Contractor shall keep on the Work at all times during its progress a competent resident superintendent.

6.1.4 The superintendent will be Contractor's representative at the site and shall have full authority to act and sign documents on behalf of Contractor.

6.1.5 All communications given to the superintendent shall be as binding as if given to Contractor.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES (continued)

6.1.6 Contractor shall cooperate with Owner and Railroad in every way possible.

6.1.7 All employees of Contractor and any Subcontractors working on railroad Right-of-Way shall be required to attend a 4-hour railroad Roadway Worker Protection course (RWP) at no cost to the Project. See Section 6.14.

6.2 CHARACTER OF WORKERS

6.2.1 Contractor shall provide a sufficient number of competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents.

6.2.2 Contractor shall at all times maintain good discipline and order at the site.

6.2.3 Owner may, in writing, require Contractor to remove from the Work any employee of Contractor or any Subcontractor whom Owner deems incompetent, careless, or otherwise detrimental to the progress of the Work, or who threatens the safety of the public or the safe operation of the railroad, but Owner shall have no duty to exercise this right.

6.3 CONTRACTOR TO FURNISH

6.3.1 Unless otherwise specified in the Contract Documents, Contractor shall furnish and assume full responsibility for all materials, equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.4 MATERIALS AND EQUIPMENT

6.4.1 All materials and equipment shall be of specified quality and new, except as otherwise provided in the Contract Documents. If required by Owner, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES (continued)

6.5 ANTICIPATED SCHEDULES

6.5.1 The construction of this project shall be planned and recorded with a suitable Project Schedule methodology. The Project Schedule shall be used for coordination and monitoring of all Work under the Contract, including all activity of subcontractors, manufacturers, suppliers, utility companies, as well as review activities of Owner and Railroad.

6.5.2 A preliminary Project Schedule shall be submitted with the Bid Form as part of Contractor’s Bid. Within a reasonable time prior to the pre-construction conference, Contractor shall submit a detailed proposed Project Schedule to Owner and Railroad for review and approval. The proposed Project Schedule shall meet the requirements set forth below. The construction time for the entire Project shall not exceed the specified Contract Time. Following Owner’s and Railroad's review, if revisions to the proposed Project Schedule are required, Contractor shall do so promptly. The Project Schedule must be finalized within fourteen (14) days of the Notice to Proceed, and prior to initiation of Work.

6.5.3 The Project Schedule shall be presented to Owner and Railroad and shall include a description of major project activities, the duration of each of the project activities, the resources required for each of the project activities, and the progress payment values assigned to the completed Work including:

6.5.3.1 Labor, showing workdays per week, holidays, shifts per day, persons per shift, and hours per shift;

6.5.3.2 Equipment, including the number of units of each type equipment.

6.5.3.3 Materials to be furnished by Contractor

6.5.4 The Project Schedule shall provide a detailed breakdown of activities scheduled for the first fourteen (14) days of the project and summary of activities for Work beyond fourteen (14) days. Said Project Schedule shall include mobilization, submittals, procurement, and construction.

6.5.5 No Work may be initiated at the site without an approved Project Schedule or an approved Project Schedule.

6.6 ADJUSTING SCHEDULES

6.6.1 Job site progress meetings will be held weekly by Owner, Railroad and Contractor for the purpose of reviewing the progress of the Work, determining upcoming work activities, updating the Project Schedule, and resolving problems and issues related to the Work.

6.6.2 The Contract Time will be adjusted only for causes specified in this Contract.

6.7 NOT USED

6.8 NOT USED

6.9 SUBSTITUTE MEANS AND METHODS

6.9.1 If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or utilize substitute means, method, sequence, technique or procedure of construction acceptable to Owner, if Contractor submits sufficient information to allow Owner to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents, and provided that Owner (directly or through its Authorized Representative(s)) accepts such substitute means and methods in writing.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES (continued)

6.10 CONTRACTOR DAILY REPORTING

6.10.1 Contractor shall prepare and submit a “Daily Activities Report” to Owner and Railroad within two (2) business days of each completed work shift. The Daily Activities Report shall include:

1. a summary of all activity on each job site;
2. a list of all manpower on site (by craft and job assignment) including Foremen and other supervisory staff on site;
3. a list of all equipment on each job site;
4. a list of all materials delivered to site and/or removed from site and used on site during the work period;
5. weather conditions (beginning of work shift and mid-shift); and
6. any other information Owner may require to have an accurate record of daily work activity.

6.11 USE OF PREMISES

6.11.1 Contractor shall confine locations of construction equipment, the storage of materials and equipment and the operations of workers to the Project limits and approved remote storage sites, lands and areas, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment.

6.11.2 Contractor shall be solely responsible for obtaining necessary and appropriate approvals to use any property beyond the Project limits (including any property owned by parties other than Owner) from the owner of such property, and shall be solely responsible for all costs and liabilities associated with Contractor's use of such property.

6.11.3 Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work.

6.11.4 Should any claim be made against Owner or Railroad by any such owner or occupant because of the performance of the Work, Contractor shall defend, indemnify and hold Owner, Railroad, and their agents harmless therefrom.

6.12 RECORD DOCUMENTS

6.12.1 Contractor shall maintain in a safe place at the site one record copy of all Technical Specifications, Addenda, field memos, work orders, Change Orders, supplemental agreements, and written interpretations and clarifications in good order and annotated to show all changes made during construction.

6.12.2 Upon completion of the Work, two (2) sets of the annotated record documents, samples and Shop Drawings shall be delivered to Owner.

6.12.3 Record documents shall accurately record elements of the Work which vary from requirements shown or described in the Contract Documents.

6.12.4 Contractor shall furnish, upon completion of the work and as a condition for receiving final payment, as-built plans for all Work, specifically "as-built" plans providing "as-built" information for all plans contained within the Contract Documents originally issued and/or updated by Owner.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES (continued)

6.12.5 One hard copy and one digital copy of each Record Document required by the Contract Documents, including those described by Subsection 6.12.4 and all warranties and guarantees required or otherwise associated with the Work shall be submitted to and accepted by Owner as a condition of final payment for Contractor's work.

6.12.6 One hard copy and one digital copy of each Record Document required by the Contract Documents, and all warranties and guarantees required or otherwise associated with the Work shall be submitted to and accepted by Owner as a condition of final payment for Contractor's work.

6.13 SAFETY AND PROTECTION

6.13.1 Contractor alone shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

6.13.2 Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.13.2.1 All employees on the Work and other persons and organizations who may be affected thereby; All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.13.2.2 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction.

6.13.3 In the performance of this Contract, Contractor shall comply with all applicable federal, state, and local laws governing safety, health, and sanitation. Contractor shall comply with all FRA and OSHA safety requirements. Contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as Owner or Railroad may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the Work covered by the Contract.

6.13.4 In accordance with the provisions of Massachusetts General Laws Chapter 30, Section 39S, all Contractor and Subcontractor Employees that are employed in the work shall have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) that is at least ten (10) hours in duration at the time the employee begins work. Contractor shall furnish documentation of said course with the first certifiable payroll report for each employee.

6.13.5 Contractor shall notify owners of adjacent property and any utilities when prosecution of the Work may affect them, and shall cooperate with such property owners and utilities in the protection, removal, relocation and replacement of their property, and shall obtain appropriate approvals from the owners of such adjacent property and/or utilities prior to performing any Work that may impact such property or utilities.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES (continued)

6.13.6 All damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by Contractor, any subcontractor, supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by Contractor with no change in Contract Amount or Contract Time except damage or loss attributable to unforeseeable causes beyond the control of and without the fault or negligence of Contractor, including but not restricted to acts of God, or governmental authorities.

6.13.7 Contractor's duties and responsibilities for the safety and protection of the Work shall continue until Final Completion except as otherwise expressly provided in connection with Substantial Completion.

6.13.8 Contractor shall designate a responsible safety representative at the site. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to Owner and Railroad.

6.14 WORKER SAFETY ON RAILROAD PROPERTY

6.14.1 The safety of personnel, property, rail operations, and the public is of paramount importance in the prosecution of the Work pursuant to this Contract. As reinforcement and in furtherance of overall safety measures to be observed by Contractor (and not by way of limitation), the following special safety rules shall be followed while performing any Work or undertaking any related activities on or near the railroad property. Further railroad safety information may be obtained in the Special Conditions.

6.14.2 Contractor shall submit their Safety Program with specific project requirements for review, comment and approval no later than seven (7) days prior to the start of work on MassDOT property.

6.14.3 In the event Contractor or its subcontractor will be performing construction or other activities on or in close proximity to a railroad track, Contractor shall be responsible for compliance with the Federal Railroad Administration's Roadway Worker Protection ("RWP") regulations (49 CFR 214, Subpart C). Under 49 CFR 214, Subpart C, railroad Contractors are responsible for the training of their employees with respect to these regulations. All RWP related Work shall be conducted in strict compliance with the RWP safety standards set forth in 49 CFR 214, Subpart C and Contractor will be required to have all of its personnel who will be on or in close proximity to a railroad track to attend all and any RWP safety classes conducted by Railroad for the benefit of Contractor's employees at no cost to the Project.

6.14.4 In the event Contractor will be performing construction or other activities on a railroad bridge, the provisions of 49 CFR 214 Subpart B regarding Bridge Worker Safety shall apply. All bridge related Work shall be conducted in strict compliance with the Safety Standards set forth in 49 CFR 214.

6.14.5 Contractor shall arrange with Railroad to keep itself informed on the time of arrival of all trains and shall stop any of Contractor's or Subcontractor's operations which might be or cause a hazard to the safe passage of the train past the Work site from 10 minutes before the expected arrival of the train until it has passed or at any other time as directed by the flagman.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES (continued)

6.14.6 Railroad flag protection is required before any activity can occur on or near a railroad operating facility such as a track, yard, bridge or shop building. For incidental work, such as surveying or inspection, a Railroad qualified flagman will provide a safety briefing prior to the commencement of the Work to discuss how and when protection from train traffic is to be provided. For any activity involving a disturbance or potential disturbance to the track, track embankment, or any railroad facility, Railroad may require a specific Railroad Safety Plan prior to startup. Projects which involve activities which cross the tracks or are longitudinal to the tracks will require a specific Railroad Safety Plan and a training course administered by Railroad for Contractor's project supervisors prior to the initiation of Work on railroad property.

6.14.7 Contractor shall arrange for Railroad flag protection when performing any Work within twenty (20) feet of any track. All Work within twenty (20) feet of the track shall cease when a train passes and all Contractor employees shall maintain a distance of at least twenty (20) feet from the track until the train has safely passed. In addition, any Work that could come within twenty (20) feet of the track will cease when a train passes. For example, crane or pile driving activities shall stop when trains pass when the maximum boom and suspended load radius can come within twenty (20) feet of the tracks. Pile driving shall not be done when trains are passing the Work site. Vehicles and other construction equipment shall not be operated or parked closer than twenty (20) feet from any track without Railroad flag protection.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES (continued)

6.14.8 Track outages require Owner's and Railroad's prior approval. Prior to a proposed track outage, Contractor shall submit a closure plan to Owner and Railroad for approval. The closure plan will describe the Work to be accomplished, the equipment, manpower and other resources required, and the schedule. Once approved by Owner and Railroad, Contractor shall follow the approved closure plan. Owner reserves the right, directly or through Railroad, to assume control of the Work to reestablish rail service if the schedule is not met. Contractor shall bear all costs and damages which may result from failure to meet the approved closure schedule

6.14.9 Whenever a Railroad flagperson/Employee-in-Charge (EIC) is required for performance of the Work, he or she will be provided by Railroad at no expense to Contractor. A minimum of 48 hours' notice is required for the scheduling of Railroad flag protection. Requests for EIC are to be made to Railroad's Roadmaster or Track Supervisor.

6.15 EMERGENCIES

6.15.1 In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury or loss, with or without special instruction or authorization from Owner or Railroad.

6.15.2 Contractor shall give Owner prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents is required because of the action taken in response to an emergency.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES (continued)

6.16 CONTINUING THE WORK

6.16.1 Contractor shall continue to carry out the Work and adhere to the Project Schedule during all disputes or disagreements with Owner or Railroad.

6.16.2 No Work shall be delayed or postponed pending resolution of any disputes, disagreements, or claims except as Contractor and Owner may otherwise agree in writing.

6.17 CONSENT TO ASSIGNMENT

6.17.1 Contractor shall obtain the prior written consent of Owner to any proposed assignment of any interest in, or part of this Contract.

6.17.2 The consent to any assignment or transfer shall not operate to relieve Contractor of any of his or its obligations under this Contract.

6.17.3 Nothing herein contained shall be construed to hinder, prevent, or affect an assignment of monies due, or to become due hereunder, made for the benefit of Contractor's creditors pursuant to law.

6.18 CONTRACTOR’S RECORDS

6.18.1 Records of Contractor and Subcontractor(s) relating to personnel, payrolls, invoices of materials, and any and all other data relevant to the performance of the Contract, must be kept on a generally recognized accounting system.

6.18.2 Such records must be available during normal work hours to Owner for purposes of investigation to ascertain compliance with provisions of the Contract Documents.

6.18.3 Payroll records must contain the name and address of each employee, his/her correct classification, social security number, rate of pay, daily and weekly number of hours of worked, deductions made, and actual wages paid and any other information required by the U.S. and/or State Department of Labor.

6.18.4 Contractor and Subcontractor(s) shall make employment records available for inspection by Owner and its representatives, and will permit such representatives to interview employees during working hours on the Project.

6.18.5 Records of all communications between Owner and Contractor, Railroad and Contractor and other parties, where such communications affected performance of this Contract, must be kept by Contractor and maintained for a period of three (3) years from Final Completion.

6.18.6 Owner and its assigned representatives may perform an audit of these records during normal work hours after written notice to Contractor.

6.18.7 In accordance with the provisions of M.G.L. Chapter 30, Section 39R, every agreement or Contract awarded where the Contract Amount is greater than One Hundred Thousand Dollars ($100,000), shall provide that:

6.18.7.1 Contractor shall make and keep for at least six (6) years after Final Payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of Contractor

6.18.7.2 Until the expiration of six (6) years after Final payment, the Office of Inspector General, and the Commissioner of Capital Asset Management and Maintenance shall have the right to examine any books, documents, papers or records of Contractor or of its Subcontractors that directly pertain to, and involve transactions relating to, the Contractor or its Subcontractors.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES (continued)

6.18.7.3 Contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with Railroad and Owner, including in its description the date of the change and reasons therefor, and shall accompany said description with a letter from the Contractor’s independent certified public accountant approving or otherwise commenting on the changes.

6.18.7.4 Contractor shall file with Owner a statement of management as to whether the system of internal controls of Contractor and its subsidiaries reasonably assures that: (1) transactions are executed in accordance with management’s general and specific authorization; (2) transactions are recorded as necessary to (i) permit preparation of financial statements in conformity with generally accepted accounting principles, and (ii) to maintain accountability for assets; (3) access to assets is permitted only in accordance with management’s general or specific authorization; and (4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

6.18.7.5 Contractor shall also make and file with Owner a statement prepared by an independent certified public accountant, stating that such certified public accountant has examined the statement of management on internal accounting controls, and expressing an opinion as to (1) whether the representations of management in respond to this Subsection and the Subsections 6.18.7.1, 6.18.7.2, 0, and 6.18.7.4 above are consistent with the result of management’s evaluation of the system of internal accounting controls; and (2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to Contractor’s financial statements.

6.18.7.6 Contractor must file, prior to the execution of the Contract, and must annually thereafter throughout the term of the Contract, an audited financial statement for the most recent completed fiscal year prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of Final Payment. All statements shall be accompanied by an accountant’s report, and such statements shall be made available to Owner upon request.

6.18.7.7 The records and statements required by this Subsection 6.18.7 shall not be public records, as defined in M.G.L. Chapter 4, Section 7, and shall not be open to public inspection; provided, however, that such records and statements shall be made available to the Office of Inspector General, and the Commissioner of Capital Asset Management and Maintenance as set forth above and in M.G.L. Chapter 30, Section 39R.

7. ARTICLE 7 – LAWS AND REGULATIONS:

7.1 LAWS TO BE OBSERVED

7.1.1 Contractor shall keep fully informed of and comply with all federal and Commonwealth of Massachusetts Legal Requirements, including, but not limited to, the applicable Sections of Chapter 30 and Chapter 149 of the Massachusetts General Laws, and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the Work, or which in any way affect the conduct of the Work.

7.1.2 Contractor shall at all times observe and comply with all such Legal Requirements, orders and decrees; and shall defend and indemnify Owner, Railroad and Indemnified Parties from and against claim or liability arising from or based on the violation of any such Legal Requirement, order, or decree whether by Contractor, Subcontractor(s), or any employee of either.

7.1.3 Except where otherwise expressly required by applicable Legal Requirements, neither Owner nor Railroad shall be responsible for monitoring Contractor's compliance with any Legal Requirements.

7.2 SANITARY PROVISIONS

7.2.1 Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of its employees and Owner's and Railroad's representatives in strict accordance with the requirements of the State and local Boards of Health, OSHA or of other bodies or tribunals having jurisdiction.

7.3 MINIMUM STATE WAGE RATES

7.3.1 The minimum wage rates to be used for this Contract are shown on the prevailing wage rate schedules in the Schedule of Prevailing Wage Rates section of the Contract Specifications. The rates shown on these schedules are the minimum to be paid during the life of the Contract. It is, therefore, the responsibility of Bidders to inform themselves as to the local labor conditions such as the length of the work day and work week, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of rates. In the event of conflict between the schedules for any classifications, the greater amount for the classification shall prevail as the minimum wage rate.

7.3.2 Contractor shall pay to any reserve police officer employed in carrying out the Work in any city or town the prevailing rate of wage paid to regular police officers in such city or town. (M.G.L. c. 149, sec. 34B)

7.3.3 If Contractor finds it necessary during the progress of the Work to secure a minimum wage rate for some additional classification, Contractor shall make a request for such additional classification to Owner to obtain the additional classification and corresponding minimum wage rate from the Commonwealth of Massachusetts Department of Labor Standards ("DLS") and advise Contractor of the same. These additional classifications and minimum wage rates are then to be considered a part of the Contract, and Contractor shall have no claim for additional compensation because of any additional classification and minimum wage rates.

7.3.4 Where a question arises as to the classification in the schedule of the DLS in which any employee is to be included, the decision is to be made by DLS, through their duly authorized representative.

7.3.5 The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans, and such payments shall be considered as payments to persons under this section performing work as provided herein. Any employer engaged in the construction of such Work who does not make payments to health and welfare plan where such payments are included in said rates of wages shall pay the amount of said payments directly to each employee engaged in said construction.

7.4 WAGES AND HOURS OF LABOR

7.4.1 The service of all laborers, workmen, mechanics, foremen and inspectors now or hereafter employed by Contractor or any Subcontractor shall be restricted to eight (8) hours in any one day, to forty-eight (48) hours in any one week, and to six (6) days in any one week, except in cases of emergency.

7.4.2 Contractor shall maintain certified payrolls bearing an original signature for Owner on a weekly basis and shall retain copies of the payrolls for a minimum of three (3) years.

7.4.3 The certification shall affirm that the payrolls are current and complete, that the wage rates contained therein are not less than any applicable rates referenced in the Contract Documents, and that the classification set forth for each laborer or mechanic conforms with the work he performed.

7.4.4 Contractor shall attend all hearings and conferences and produce such books, papers, and documents all as requested by Owner.

8. ARTICLE 8 – CHANGES:

8.1 OWNER’S RIGHT TO CHANGE

8.1.1 Without invalidating the Contract, Owner may give direction and/or approval, order additions, deletions or other modifications to the Work.

8.2 DIRECTIVE

8.2.1 Owner shall provide written clarification or interpretation of the Contract Documents pursuant to Section 0.

8.2.2 Owner may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Amount or the Contract Time and are consistent with the overall intent of the Contract Documents.

8.2.3 Owner may order Contractor to correct defective work or methods which are not in conformance with the Contract Documents.

8.3 CHANGE ORDER

8.3.1 A change in Contract Time, Contract Amount, or responsibility may be made for changes within the scope of the Work only by Change Order which must be requested and approved in advance of performing any Work by Contractor.

8.3.2 Upon receipt of an executed Change Order indicating approval of the Work by Owner, Contractor shall promptly proceed with the Work involved, and such Work will be performed under the applicable conditions of the Contract Documents except as otherwise specifically provided.

ARTICLE 8 – CHANGES (continued)

8.3.3 Changes in Contract Amount and Contract Time shall be made in accordance with Articles 9 and 10. NO ADDITIONAL WORK SHALL BE UNDERTAKEN, NO ADDITIONAL COSTS OR EXTENSIONS OF TIME MAY BE CONSIDERED OR OCCUR WITHOUT OWNER'S EXPRESS WRITTEN AUTHORIZATION, IN ADVANCE.

8.4 UNAUTHORIZED WORK

8.4.1 Contractor shall not be entitled to an increase in the Contract Amount or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in this Article 8, except in the case of an emergency as provided in Section 6.15.

8.5 DIFFERING SITE CONDITIONS (M.G.L. c. 30, sec. 39N)

8.5.1 If, during the progress of the Work, the Contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the Contract Documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

8.5.2 For purposes of Subsection 8.5.1 above, the terms "awarding authority" and "contracting authority" shall refer to Owner.

8.5.3 Contractor shall promptly, and before such conditions are disturbed (except in an emergency as permitted by Section 6.15), notify Owner in writing of:

8.5.3.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the Contract, and which could not have been discovered by a careful examination of the site, or

8.5.3.2 Physical conditions at the site of an unknown or an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in this Contract.

8.5.4 Owner shall promptly investigate the conditions, and if Owner finds that such conditions do materially so differ and cause an increase or decrease in Contractor's cost of, or time required for performance of this Contract, an equitable adjustment shall be made, and the Contract shall be modified in writing accordingly.

ARTICLE 8 – CHANGES (continued)

8.5.5 Any claim for additional compensation by Contractor pursuant to this Section shall be made in accordance with Article 14 and shall not be allowed unless Contractor has first given the notice required by this Contract.

8.5.6 In the event that Owner and Contractor are unable to reach an agreement concerning an alleged differing site condition, Contractor will be required to keep an accurate and detailed record which will indicate the actual cost of the Work performed as a result of the alleged differing site condition.

8.5.7 Failure to keep such a record shall be a bar to any recovery by reason of such alleged differing site conditions. Owner shall be given the opportunity to supervise and check the keeping of such records.

9. ARTICLE 9 – CONTRACT AMOUNT – COMPUTATION AND CHANGE:

9.1 CONTRACT AMOUNT

9.1.1 The Contract Amount constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor’s expense without change in the Contract Amount. The Contract Amount may only be changed by written Change Order.

9.2 CLAIM FOR CHANGE IN CONTRACT AMOUNT

9.2.1 Any claim for an increase or decrease in the Contract Amount shall be submitted in accordance with the terms of this Article 9, and shall not be allowed unless the notice requirements of this Contract have been met.

9.3 CHANGE ORDER PRICE DETERMINATION

9.3.1 The value of any Work covered by a Change Order for an increase or decrease in the Contract Amount shall be determined in one of the following ways:

9.3.1.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of Section 9.9).

9.3.1.2 By mutual acceptance of a lump sum price which includes overhead and profit.

9.3.2 When Subsections 9.3.1.1 and 9.3.1.2 do not apply, on the basis of the Cost of the Work (determined as provided in Sections 9.4 and 0) plus a Contractor’s fee for overhead and profit (determined as provided in Section 9.6).

9.3.3 Owner must approve any proposed changes to Time or Cost of Work by written Authorization before the Change Order is issued.

9.4 COST OF THE WORK

9.4.1 The term Cost of the Work means the sum of all costs actually incurred and necessary to carry out the Work and paid by Contractor in the proper performance of the Work.

ARTICLE 9 – CONTRACT AMOUNT – COMPUTATION AND CHANGE (continued)

9.4.2 Except as otherwise may be agreed to in writing by Owner, such costs shall be in amount no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Section 0:

9.4.2.1 Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor.

9.4.2.2 Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work.

9.4.2.3 Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include Social Security contributions, unemployment, excise and payroll taxes, workers' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto.

9.4.2.4 Such employees shall include superintendents and foremen at the site.

9.4.2.5 The expenses of performing Work after regular working hours, on Saturday, Sunday or Legal Holidays shall be included in the above to the extent authorized by Owner.

9.4.2.6 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

9.4.2.7 Costs of special Consultants (including but not limited to engineers, architects, testing laboratories, and surveyors) employed for services necessary for the completion of the Work.

9.4.2.8 Supplemental costs including the following:

9.4.2.8.1 The proportion of necessary transportation, travel and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

9.4.2.8.2 Costs, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by Contractor, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed, and which remain the property of Contractor.

ARTICLE 9 – CONTRACT AMOUNT – COMPUTATION AND CHANGE (continued)

9.4.2.8.3 Rentals of all construction equipment and machinery and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner and the costs of transportation, loading, unloading, installation, dismantling and removal thereof - all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

9.4.2.8.4 Sales, consumer, use or similar taxes related to the Work, and for which Contractor is liable.

9.4.2.8.5 Fees for permits and licenses.

9.4.2.8.6 Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work or otherwise sustained by Contractor in connection with the performance and furnishing of the Work, provided they have resulted from causes other than the negligence of Contractor, any Contractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee. If, however, any such loss or damage requires reconstruction and Contractor is placed in charge thereof, Contractor shall be paid for services a fee in accordance with Section 9.6.

9.4.2.8.7 The cost of utilities, fuel and sanitary facilities at the site.

9.4.2.8.8 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work

9.4.2.8.9 Cost of premiums for additional bonds and insurance required because of changes in the Work and premiums for property insurance coverage within the limits of the deductible amounts established by Owner in accordance with Article 5.

ARTICLE 9 – CONTRACT AMOUNT – COMPUTATION AND CHANGE (continued)

9.5 EXCLUDED COSTS

9.5.1 The term Cost of the Work shall not include any of the following:

9.5.1.1 Payroll costs and other compensation of Contractor's officers, executives, principles (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agency, expediters, timekeepers, clerks and other personnel employed by Contractor whether at the site or in Contractor's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Subsection 9.4.2.1 - all of which are to be considered administrative costs covered by Contractor's Fee.

9.5.1.2 Expenses of Contractor's principal and branch offices.

9.5.1.3 Any part of Contractor's capital expenses including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

9.5.1.4 Cost of premiums for all insurance whether or not Contractor is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by Subsection 9.4.2.8.9 above).

9.5.1.5 Costs due to the negligence of Contractor, any subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective work, disposal of materials or equipment wrongly supplied and making good any damage to property.

9.5.1.6 Costs for the use of small tools having a value of five hundred dollars ($500) or less.

9.5.1.7 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Section 9.4.

9.6 CONTRACTOR'S FEE

9.6.1 Contractor's fee allowed to Contractor for overhead and profit shall be a negotiated, mutually agreed upon fixed fee between Contractor and Owner. Contractor's fee shall be identified in the Contract between Owner and Contractor and shall apply to both originally bid Work and any work Authorized by approved Change Order. If no fee can be agreed upon, a fee based on the following percentages of the various portions of the cost of the Work:

9.6.1.1 For costs incurred under Subsections 9.4.2.1 through 9.4.2.6, Contractor's Fee shall be 5%;

9.6.1.2 For costs incurred under Subsections 9.4.2.7 and 9.4.2.8 Contractor's Fee shall be 5%.

9.6.2 No fee shall be payable on the basis of costs itemized under Section 0;

9.6.3 The amount of credit to be allowed by Contractor to Owner for any such change which results in a net decrease in cost will be the amount of the actual net decrease plus a deduction in Contractor's fee by a mutually agreed upon amount, or, if none can be agreed upon, then an amount equal to 5% of the net decrease; and

9.6.4 When both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Subsections 9.6.1.1 and 9.6.1.2.

ARTICLE 9 – CONTRACT AMOUNT – COMPUTATION AND CHANGE (continued)

9.7 COST BREAKDOWN

9.7.1 Whenever the cost of any Work is to be determined pursuant to Sections 9.4 and 0, Contractor will submit an itemized cost breakdown together with supporting data in a form acceptable to Owner.

9.8 UNIT PRICE WORK

9.8.1 Where the Contract Documents provide that all or part of the work is to be Unit Price Work, initially the Contract Amount will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Contract.

9.8.2 The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Amount.

9.8.3 Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Owner in accordance with Section 9.9.

9.8.4 Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor’s overhead and profit for each separately identified item.

9.8.5 If the “Basis of Payment” clause in the Contract Documents relating to any unit price in the bid schedule requires that the said unit price cover and be considered compensation for certain Work or material essential to the item, this same Work or material will not also be measured or paid for under any other pay item which may appear elsewhere in the Contract Documents.

9.8.6 Payment to Contractor shall be made only for the actual quantities of Work performed and accepted or materials furnished, in conformance with the Contract Documents.

9.8.7 When the accepted quantities of Work or materials vary from the quantities stated in the bid schedule, or change documents, Contractor shall accept as payment in full, payment at the stated unit prices for the accepted quantities or Work and materials furnished, completed and accepted.

9.9 DETERMINATIONS REGARDING UNIT PRICES AND QUANTITIES

9.9.1 Owner will determine the actual quantities and classifications of Unit Price Work performed by Contractor.

9.9.2 Owner’s certification thereon will be final and binding on Contractor, unless, within ten (10) days after the date of any such decision, Contractor delivers to Owner written notice of intention to appeal from such a decision.

10. ARTICLE 10 – CONTRACT TIME – COMPUTATION & CHANGE:

10.1 COMMENCEMENT OF CONTRACT TIME – NOTICE TO PROCEED

10.1.1 The Contract Time will commence to run on the day indicated in the Notice to Proceed.

ARTICLE 10 – CONTRACT TIME – COMPUTATION AND CHANGE (continued)

10.2 STARTING THE WORK

10.2.1 No Work on Contract items shall be performed before the effective date of the Notice to Proceed. Contractor shall notify Owner and Railroad at least forty-eight (48) hours in advance of the time actual construction operations will begin.

10.3 COMPUTATION OF CONTRACT TIME

10.3.1 When the Contract Time is specified on a calendar days basis, all Work under the Contract shall be completed within the number of calendar days specified.

10.3.2 The count of Contract Time begins on the day following receipt of the Notice to Proceed by Contractor, if no starting day is stipulated therein.

10.3.3 Calendar days shall continue to be counted against Contract Time until and including the date of Final Completion of the Work.

10.3.4 When the Contract completion time is specified as a fixed calendar date, it shall be the date of Final Completion.

10.4 TIME CHANGE

10.4.1 The Contract Time may only be changed by a Change Order. Any extension for time needs to be approved by Owner in advance.

10.5 EXTENSION DUE TO DELAYS

10.5.1 The right of Contractor to proceed shall not be terminated nor Contractor charged with liquidated or actual damages because of any delays to the completion of the Work due to unforeseeable causes beyond the control and without the fault or negligence of Contractor, including, but not restricted to the following: acts of God; acts of Owner; acts of another Contractor in the performance of a contract with Owner or Railroad; floods, fires, epidemics, quarantine restrictions, strikes, freight embargoes, or unusually severe weather; and delays of Subcontractors or suppliers due to such causes.

10.5.2 Any delay in receipt of materials on the site, caused by other than one of the specifically mentioned occurrences above, does not of itself justify a time extension.

10.5.3 Owner shall ascertain the facts and the extent of the delay and extend the time for completing the Work when the findings of fact justify such an extension.

10.6 ESSENCE OF CONTRACT

10.6.1 All time limits stated in the Contract Documents are of the essence to the Contract.

10.7 REASONABLE COMPLETION TIME

10.7.1 It is expressly understood and agreed by and between Contractor and Owner that the date of beginning and the time for Final Completion of the Work described herein are reasonable times for the completion of the Work.

10.8 DELAY IN COMPLETION OF THE WORK; LIQUIDATED DAMAGES

10.8.1 In the event that Contractor does not proceed with the Work within the time frame stipulated in the Contract Documents or otherwise fails to perform the other work specified in the Contract Documents in reasonable accordance with the Project Schedule, so as to complete the Work on or before the time for Final Completion, Owner may terminate the Contract, and seek to complete the Work pursuant to the provisions of and with funding provided by Contractor's Performance Bond.

10.8.2 Whether or not Contractor's right to proceed with the Work is terminated, Contractor shall be liable for damages resulting from Contractor’s refusal or failure to complete the Work within the specified time. **Note: Liquidated damages for delay shall be paid by Contractor to Owner in the amount of $1,000 for each calendar day the completion of the Work or any part thereof is delayed beyond the Contract Time required by the Contract, or any extension thereof.**

10.8.3 Contractor acknowledges that the liquidated damages established herein are not a penalty but rather constitute an estimate of damages that Owner will sustain by reason of delayed completion. These liquidated damages are intended as compensation for losses that are difficult to estimate.

10.8.4 These damages will continue to run both before and after termination in the event of default termination. These liquidated damages do not cover excess costs of completion, Owner' costs, fees, and charges related to solicitation and selection of an alternative work force to complete the Work.

11. ARTICLE 11 – QUALITY ASSURANCE:

11.1 WARRANTY AND GUARANTY

11.1.1 Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective.

11.1.2 Prompt notice of all defects shall be given to Contractor. All defective work, whether or not in place, may be rejected, corrected or accepted as provided for in this Article.

11.2 ACCESS TO WORK

11.2.1 Owner, Railroad, their representatives, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. Contractor shall provide proper and safe conditions for such access.

11.3 TESTS AND INSPECTIONS

11.3.1 Contractor shall give Owner and Railroad timely notice of readiness of the Work for all required inspections.

11.4 OWNER MAY STOP THE WORK

11.4.1 If the Work is defective, or Contractor fails to supply suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; provided, however, that the right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise the right for the benefit of Contractor or any other party.

ARTICLE 11 – QUALITY ASSURANCE (continued)

11.5 CORRECTION OR REMOVAL OF DEFECTIVE WORK

11.5.1 If required by Owner, Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Owner, remove it from the site and replace it with Work which conforms to the requirements of the Contract Documents. Contractor shall bear all direct, indirect and consequential costs of such correction removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

11.6 ONE YEAR CORRECTION PERIOD

11.6.1 If within one (1) year after the date of Final Completion or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective Work, or, if it has been rejected by Owner , remove it from the site and replace it with conforming Work.

11.6.2 If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by Contractor.

11.7 ACCEPTANCE OF DEFECTIVE WORK

11.7.1 Instead of requiring correction or removal and replacement of defective Work, Owner may accept defective Work. All decisions with respect to acceptance of defective Work are solely at the discretion of, and to be made by, Owner. In the event of Owner's decision to accept defective Work, Contractor shall bear all direct, indirect and consequential costs attributable to Owner's evaluation of and determination to accept such defective Work (costs to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals).

11.7.2 Any acceptance of defective Work, as described in Subsection 11.7.1, shall only be contemplated upon written notification and request by Owner supported by documentation to support the request.

11.7.3 If any such acceptance occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work and Owner shall be entitled to an appropriate decrease in the Contract Amount.

12. ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION:

12.1 SCHEDULE OF VALUES

12.1.1 The schedule of values or progress payment values established as provided in Section 0 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Owner. Progress payments on account of Unit Price Work will be based on the number of units completed.

ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION (continued)

12.2 PRELIMINARY PAYMENTS

12.2.1 Upon approval of the schedule of values Contractor may be paid for direct costs substantiated by paid invoices and other prerequisite documents required by the Contract Documents. Direct costs shall include the cost of bonds, insurance, approved materials stored on the site or at approved remote storage sites, deposits required by a supplier prior to fabricating materials, and other approved direct mobilization costs substantiated as indicated above. These payments shall be included as a part of the total Contract Amount as stated in the Contract.

12.3 APPLICATION FOR PROGRESS PAYMENT

12.3.1 Contractor shall submit to Owner for review a complete and accurate Application for Payment signed by Contractor covering the Work completed as of the date of the Application for Payment and accompanied by such supporting documentation as required by the Contract Documents.

12.3.2 Progress payments will be made as the Work progresses on a monthly basis.

12.4 REVIEW OF APPLICATION FOR PROGRESS PAYMENT

12.4.1 Owner will either provide a written recommendation for payment, or return the Application for Payment to Contractor indicating in writing Owner's reasons for refusing to recommend payment.

12.4.2 If the latter case, Contractor shall make the necessary corrections and resubmit the Application for Payment.

12.5 PAYMENTS TO SUBCONTRACTORS (M.G.L. c. 30, sec. 39F)

12.5.1 In accordance with M.G.L. Chapter 30, Sections 39F, the following Subsections shall be binding between the Contractor and each Subcontractor. For purposes of this Subsection 12.5.1, the term "Subcontractor" shall mean: (1) a person approved by Owner in writing as a person performing labor or both performing labor and furnishing materials pursuant to the Contract; and (2) a person contracting with the Contractor to supply materials used or employed in the Work for a price in excess of Five Thousand Dollars ($5,000). In addition, for purposes of this Subsection 12.5.1: the term "general contractor" shall mean Contractor; the term "subcontractor" shall mean "Subcontractor"; the term "awarding authority" shall mean Owner.

12.5.1.1 Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION (continued)

12.5.1.2 Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

12.5.1.3 Each payment made by the awarding authority to the general contractor pursuant to Subsections 12.5.1.1 and 0 of this Subsection for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a payment to the general contractor for payment to the subcontractor as provided in Subsection 12.5.1.1 and 0, the awarding authority shall act upon the demand as provided in this section.

12.5.1.4 If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION (continued)

12.5.1.5 Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by Subsection 12.5.1.4. The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this Subsection.

12.5.1.6 The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of Subsection 0 in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

12.5.1.7 All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to Subsection 12.5.1.6 shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

12.5.1.8 The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to Subsection 12.5.1.6, are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION (continued)

12.6 WITHHOLDING OF PAYMENTS

12.6.1 Owner may withhold or refuse payment for any of the reasons listed below provided it gives written notice of its intent to withhold and of the basis for withholding:

- 12.6.1.1 The Work is defective, or completed Work has been damaged requiring correction or replacement, or has been installed without approved shop drawings, or by an unapproved Contractor.
- 12.6.1.2 The Contract Amount has been reduced by Change Order.
- 12.6.1.3 Owner or Railroad has been required to correct Defective Work or complete Work in accordance with Section 12.10.
- 12.6.1.4 Owner’s or Railroad's actual knowledge of the occurrence of any of the events enumerated in Subsections 13.2.1.1 through 13.2.1.12 inclusive.
- 12.6.1.5 Claims have been made against Owner on account of Contractor's actions or inactions in performing this Contract, or there are other items entitling Owner to a set-off.
- 12.6.1.6 Subsequently discovered evidence or the results of subsequent inspections or tests, nullify any previous payments for reasons stated in Subsections 12.6.1.1 through 12.6.1.5.
- 12.6.1.7 Contractor has failed to fulfill or is in violation of any of its obligations under any provision of this Contract.

12.7 RETAINAGE

12.7.1 A percentage of a Contractor’s Application for Payment may be withheld if, in Owner’s judgment, a portion of the Work for which payment is requested has not been completed according to the Project Plans and Specifications. The percentage withheld will be commensurate with the proportion of the incomplete Work in relation to the total amount of the Application for Payment. Any amount withheld shall be promptly processed for payment upon satisfactory completion and acceptance of the Work.

12.8 SUBSTANTIAL COMPLETION (M.G.L. c. 30, sec. 39G)

12.8.1 When Contractor considers the Work is Substantially Complete (as defined herein) and is ready for its intended use Contractor shall present Owner a written certification that the Work, or a designated portion thereof, has been Substantially Completed (except for items specifically listed by Contractor as incomplete) (“Contractor’s Notice of Substantial Completion”), and shall request that Owner issue a written declaration that such Work has been Substantially Completed (a “Certificate of Substantial Completion”).

12.8.2 Within ten (10) days following the date of Contractor’s Notice of Substantial Completion, Railroad, Contractor, and Owner’s Authorized Representative(s) shall make an inspection of such Work to determine the status of completion.

ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION (continued)

12.8.3 If Owner agrees that the Work is Substantially Complete, Owner shall, within twenty-one (21) days of Contractor's Notice of Substantial Completion, execute and deliver a declaration of Substantial Completion, in the form of a Certificate of Substantial Completion as to such Work. If Owner does not consider the Work to be Substantially Complete, Owner shall, no later than twenty-one (21) days following the date of Contractor's Notice of Substantial Completion, present to Contractor an itemized list of incomplete and unsatisfactory Work items required by the Contract, sufficient to demonstrate that the Work has not been Substantially Completed. Owner may include with such list a notice setting forth a reasonable time within which Contractor must achieve Substantial Completion of the Work, provided that such time shall be prior to the Contract Completion Date. In either event, Owner may include in its transmittal to Contractor a list of additional outstanding items and responsibilities to be addressed by Contractor in accordance with the Contract Documents prior to Final Completion and acceptance.

12.8.4 In the event that Owner fails to respond as set forth above within the twenty-one (21) day period, the Contractor's certification shall take effect as Owner's declaration that the Work has been Substantially Completed.

12.8.5 Owner shall, no later than sixty-five (65) days after the effective date of a declaration of Substantial Completion, prepare and transmit to Contractor for acceptance a Substantial Completion estimate for the quantity and price of the Work performed and all but one percent (1%) retainage, if held by Owner, on that Work, including the quantity, price and all but one percent (1%) retainage, if held by Owner, for the undisputed part of each work item and extra work item in dispute, but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory work items, and less the total periodic payments made to date for the Work. Owner shall also deduct from the Substantial Completion estimate an amount equal to the sum of all demands for direct payments filed by Subcontractors and not yet paid to Subcontractors or deposited in joint accounts pursuant to M.G.L. Chapter 30, Section 39F and Subsection 12.5.1 hereof.

12.8.6 If Owner fails to prepare and transmit to Contractor any Substantial Completion estimate as required by this Section 12.8 on or before the dates set forth herein, Owner shall pay to Contractor interest on the amount which would have been due to Contractor pursuant to such Substantial Completion estimate at the rate of three (3) percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston from such date to the date on which Owner transmits the Substantial Completion estimate to Contractor or the date of payment therefor, whichever occurs first. Owner shall include the amount of such interest in the Substantial Completion estimate.

12.8.7 Within fifteen (15) days after the effective date of issuance of the Certificate of Substantial Completion or other recognized declaration of Substantial Completion, Owner shall send to Contractor, by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory work items, and, unless delayed by causes beyond Contractor's control, Contractor shall complete all such work items within forty-five (45) days after receipt of such list or before the then Contract Completion Date, whichever is later. If Contractor fails to complete the Work within such time, Owner may, after seven (7) days' written notice to Contractor by certified mail, return receipt requested, terminate the Contract and complete the incomplete or unsatisfactory work items and charge the cost of same to Contractor.

ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION (continued)

12.8.8 Owner shall be responsible for all of its costs for the initial inspection relating to Substantial Completion, and the first re-inspection, and Contractor shall pay all costs incurred by Owner (including Railroad's charges) resulting from re-inspections thereafter.

12.8.9 When Contractor considers all Work required by the Contract to be complete, Contractor shall provide written notice to Owner stating that all work required by the Contract has been completed ("Contractor's Notice of Final Completion").

12.8.10 Within ten (10) days following the date of Contractor's Notice of Final Completion, Railroad, Contractor, and Owner's Authorized Representative(s) shall make a final inspection of the Work to determine the status of completion.

12.8.11 Within thirty (30) days after receipt by Owner of Contractor's Notice of Final Completion, Owner shall prepare and transmit to Contractor for acceptance a final estimate for the quantity and price of the Work performed and all retainage, if held by Owner, on that Work less all payments made to date, unless Owner's inspection shows that Work items required by the Contract remain incomplete or unsatisfactory, or that documentation required by the Contract has not been completed. If Owner fails to prepare and transmit to Contractor the final estimate within thirty (30) days after receipt of Contractor's Notice of Project Completion, Owner shall pay to Contractor interest on the amount which would have been due to Contractor pursuant to such final estimate at the rate hereinabove provided from the thirtieth (30th) day after such completion until the date on which Owner sends the final estimate to Contractor for acceptance or the date of payment therefor, whichever occurs first; provided that Owner's inspection shows that no work items required by the Contract remain incomplete or unsatisfactory. Interest shall not be paid hereunder on amounts for which interest is required to be paid in connection with the Substantial Completion estimate as hereinabove provided. Owner shall include the amount of the interest required to be paid hereunder in the final estimate.

12.8.12 After Contractor has completed all such corrections to the satisfaction of Owner, and has delivered all guarantees, bonds, certificates of payment to all laborers, Subcontractors and suppliers, certificates of inspection, marked-up record documents and other documents, all as required by the Contract Documents, and after Owner has indicated that the Work is acceptable (subject to the provisions of Section 12.13), Contractor may make application for final payment following the procedure for progress payments (the "Final Application for Payment").

12.8.13 The Final Application for Payment shall be accompanied by two (2) copies of all certificates, warranties, guaranties, releases, affidavits, and other documentation required by the Contract Documents. These two (2) copies shall be submitted to Owner and shall be a condition of Final Payment by Owner.

12.8.14 All requirements of Sections 12.8 through 12.13 and Subsections 6.12.4 through 6.12.6 must be met prior to Owner approval of the Final Application for Payment.

12.8.15 Owner shall pay the amount due pursuant to any Substantial Completion or Final estimate within thirty-five (35) days after receipt of written acceptance for such estimate from Contractor and shall pay interest on the amount due pursuant to such estimate at the rate hereinabove provided from that thirty-fifth (35th) day to the date of payment.

ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION (continued)

12.9 ACCESS FOLLOWING SUBSTANTIAL COMPLETION

12.9.1 Owner and Railroad shall have the right to exclude Contractor from the site after the date of Substantial Completion, provided that, Owner and Railroad shall allow Contractor reasonable access to the Project site to complete or correct Work items identified in Subsection 0.

12.10 FINAL INSPECTION

12.10.1 Upon written notice from Contractor that the entire Work is complete, Owner’s Authorized Representative(s) will make a final inspection with Contractor and Railroad, and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective.

12.10.2 Contractor shall promptly take such measures as are necessary to remedy such deficiencies.

12.10.3 Contractor shall pay for all costs incurred by Owner (including Railroad’s charges) resulting from re-inspections.

12.11 FINAL APPLICATION FOR PAYMENT

12.11.1 After Contractor has completed all such corrections to the satisfaction of Owner, and has delivered all guarantees, bonds, certificates of payment to all laborers, subcontractors and suppliers, certificates of inspection, marked-up record documents and other documents, all as required by the Contract Documents, and after Owner has indicated that the Work is acceptable (subject to the provisions of Section 12.13), Contractor may make application for final payment following the procedure for progress payments (the “Final Application for Payment”).

12.11.2 The Final Application for Payment shall be accompanied by two (2) copies of all certificates, warranties, guaranties, releases, affidavits, and other documentation required by the Contract Documents. These two (2) copies shall be submitted to Owner and shall be a condition of Final Payment by Owner.

12.11.3 All requirements of Subsections 6.12.4 through 6.12.6 must be met prior to Owner approval and payment of the Final Application for Payment.

12.12 FINAL PAYMENT AND FINAL COMPLETION

12.12.1 If, on the basis of Owner’s and Railroad's observation of the Work during construction and final inspection, and Owner’s review of the Final Application for Payment and accompanying documentation all as required by the Contract Documents, Owner is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Owner will make payment of the Final Application for Payment.

12.12.2 Otherwise, Owner will return the Final Application for Payment to Contractor, indicating in writing the reasons for refusing to process final payment, in which case Contractor shall make the necessary corrections and resubmit the application for final payment.

12.12.3 If, through no fault of Contractor, final completion of the Work is significantly delayed, Owner shall, upon receipt of Contractor's Final Application for Payment, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted.

12.12.4 Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

ARTICLE 12 – PAYMENTS TO CONTRACTOR AND COMPLETION (continued)

12.13 FINAL ACCEPTANCE

12.13.1 Following receipt of Contractor’s release with no exceptions, and certification that laborers, subcontractors and material men have been paid, certification of payment of payroll and revenue taxes, and final payment to Contractor, Owner will issue a letter of Final Completion, releasing Contractor from further obligations under the Contract, except as provided in Section 12.14.

12.14 CONTRACTOR’S CONTINUING OBLIGATION

12.14.1 Contractor's obligation to perform and complete the Work and pay all laborers, subcontractors, and material in accordance with the Contract Documents shall be absolute.

12.14.2 Neither any progress or final payment by Owner, nor the issuance of a Certificate of Substantial Completion, nor any use or occupancy of the Work or any part thereof by Owner or Railroad, nor any act of acceptance by Owner nor any failure to do so, nor any correction of defective Work by Railroad or Owner will constitute an acceptance of Work not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents.

12.15 WAIVER OF CLAIMS BY CONTRACTOR

12.15.1 The making and acceptance of final payment will constitute a waiver of all claims by Contractor against Owner, and/or Railroad, other than those previously made in writing and that remain unsettled.

12.16 NO WAIVER OF LEGAL RIGHTS

12.16.1 Owner shall not be precluded or be estopped by any payment, measurement, estimate, or certificate made either before or after the completion and acceptance of the Work and payment therefore, from showing the true amount and character of the Work performed and materials furnished by Contractor, nor from showing that any payment, measurement, estimate or certificate is untrue or is incorrectly made, or that the Work or materials are defective.

12.16.2 Owner shall not be precluded or be estopped, notwithstanding any such measurement, estimate, or certificate and payment in accordance therewith, from recovering from Contractor such damages as it may sustain by reason of Contractor’s failure to comply with requirements of the Contract Documents.

12.16.3 Neither the acceptance by Owner, or any representative of Owner, nor any payment for or acceptance of the whole or any part of the Work, nor any extension of the Contract Time, nor any possession taken by Owner or Railroad, shall operate as a waiver of any portion of the Contract or of the power herein reserved, or of any right to damages.

12.16.4 A waiver by Owner of any breach of the Contract shall not be held to be a waiver of any other subsequent breach.

13. ARTICLE 13 – SUSPENSION OF WORK – DEFAULT AND TERMINATION:

13.1 OWNER MAY SUSPEND WORK

13.1.1 General (M.G.L. c. 30, sec. 39O)

13.1.1.1 The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

13.1.1.2 The general contractor must submit the amount of a claim under Subsection 13.1.1.1 to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

13.1.1.3 For purposes of this Subsection 13.1.1: the term “awarding authority” shall refer to Owner; the term “general contractor” shall refer to Contractor; the term “contract” shall mean the Contract

13.1.2 Owner may, at any time, suspend the Work or any portion thereof by written notice to Contractor. If the Work is suspended without cause Contractor shall be allowed an increase in the Contract Amount or an extension of the Contract Time, or both, directly attributable to any suspension if Contractor makes an approved claim therefore as provided in Article 14. Any action by Owner to allow an increase in the Contract Amount or to allow an extension of the Contract Time may only be done with the prior written authorization of Owner. Owner shall not be liable to Contractor for any additions to the Contract Amount or extensions in the Contract Time that it has not approved in writing in advance.

13.1.3 However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that suspension is due to the fault or negligence of the Contractor, or that suspension is necessary for Contract compliance, or that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor or Acts of God (which shall be deemed to include severe weather conditions precluding prosecution of the Work).

13.1.4 In case of suspension of Work, Contractor shall be responsible for preventing damage to or loss of any of the Work already performed and of all materials whether stored on or off the site or approved remote storage sites.

ARTICLE 13 – SUSPENSION OF WORK – DEFAULT AND TERMINATION (continued)

13.2 DEFAULT OF CONTRACTOR

13.2.1 If Contractor:

- 13.2.1.1 Fails to begin the Work under the Contract within the time specified in the Contract Documents, or
- 13.2.1.2 Fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workmen or suitable materials or equipment or failure to adhere to the progress schedule established under Sections 0 and 6.6 as revised from time to time), or
- 13.2.1.3 Performs the Work unsuitably or neglects or refuses to remove materials or to correct defective Work, or
- 13.2.1.4 Discontinues the prosecution of the Work, or
- 13.2.1.5 Fails to resume Work which has been discontinued within a reasonable time after notice to do so, or
- 13.2.1.6 Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency except as prohibited by 11 U.S.C. 363, or
- 13.2.1.7 Allows any final judgment to stand against him unsatisfied for period of sixty (60) days, or
- 13.2.1.8 Makes an assignment for the benefit of creditor without the consent of Owner, or
- 13.2.1.9 Disregards requirements or orders of any public body having jurisdiction, or
- 13.2.1.10 Otherwise violates in any substantial way any provisions of the Contract Documents, or
- 13.2.1.11 For any cause whatsoever, fails to carry on the Work in an acceptable manner, or
- 13.2.1.12 Fails to provide and maintain any insurance policy as set forth herein,

Owner may give Notice in writing to Contractor of such delay, neglect, or default ("Notice of Default").

13.2.2 If Contractor, within the time specified in the above Notice of Default, shall not proceed in accordance therewith, then Owner may, upon written notification to Contractor and Contractor's surety of the fact of such delay, neglect or default and Contractor's failure to comply with such notice, have full power and authority without violating the Contract, to take the prosecution of the Work out of the hands of Contractor.

13.2.3 Owner may terminate the services of Contractor, exclude Contractor from the site and take possession of the Work, and obtain and expend funds from the Performance Bond and the Payment Bond (as applicable) to complete the Work as required by the Contract Documents.

13.2.4 Owner may enter into an agreement for the completion of said Contract Work according to the terms and provisions of the Contract, or use such other methods that in the opinion of Owner are required for the completion of said Contract in an acceptable manner.

ARTICLE 13 – SUSPENSION OF WORK – DEFAULT AND TERMINATION (continued)

13.2.5 Owner may, by written notice to Contractor, transfer the completion of the Work from Contractor to another organization, or, if Contractor abandons the Work undertaken under the Contract, Owner may, at its option and without any written notice to Contractor, transfer the completion of the Work to another organization.

13.3 RIGHTS OR REMEDIES

13.3.1 Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue.

13.3.2 Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

14. ARTICLE 14 – CLAIMS AND DISPUTES:

14.1 OWNER'S DECISION

14.1.1 With regard to any claim or dispute raised by Contractor, Owner will make a determination of the validity and disposition of the claim or dispute and Contractor will be furnished with Owner's decision within ninety (90) days of the receipt of the claim or dispute unless additional information is requested by Owner. Owner's decision is final and conclusive unless Contractor appeals in accordance with Article 14.2.

14.2 NOTICE OF APPEAL

14.2.1 Within fourteen (14) days of receipt of Owner's decision, Contractor may deliver a Notice of Appeal to Owner and request a hearing.

14.2.2 The Notice of Appeal shall include specific exceptions to Owner's decision, including specific provisions of the Contract, which Contractor intends to rely upon in the appeal.

14.2.3 General assertions that Owner's decision is contrary to law or to fact shall not be deemed sufficient.

ARTICLE 14 – CLAIMS AND DISPUTES (continued)

14.3 OWNER'S DECISION ON APPEAL

14.3.1 The decision of Owner on appeal will be rendered within ninety (90) days after the receipt of the Notice of Appeal.

14.3.2 The time limits given above may be extended by mutual consent.

14.3.3 The decision of Owner on appeal shall be final and conclusive.

15. ARTICLE 15 – MISCELLANEOUS:

15.1 GOVERNING LAW

15.1.1 This Contract shall be governed by the laws of the Commonwealth of Massachusetts.

15.2 CONTRACT CLAUSES / SEVERABILITY

15.2.1 If any contract clause is declared null and void, then all other clauses shall remain in force.

16. ARTICLE 16 – STATUTORY REQUIREMENTS FOR PROJECTS UNDER M.G.L. c.30 s.39:

16.1 WORKERS COMPENSATION INSURANCE:

16.1.1 Contractor before commencing performance of the work required to be done under the Contract, shall provide for the payment of the compensation provided by Massachusetts General Laws, Chapter 152, as amended, to all persons to be employed by him in connection with the said performance and he shall continue in full force and effect throughout the period required for the completion of the improvement such insurance as may be required under said chapter. The persons for whom compensation is to be provided shall include those reserve or special police officers employed by Contractor for the purpose of directing or maintaining traffic or similar purposes within the site of the improvement and paid directly by him for such services; they shall not include, however, any regular police officer employed for said purpose.

16.1.2 Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the Contract and shall operate as an immediate termination thereof.

16.1.3 Such insurance shall not be canceled or otherwise terminated until ten days after written notice of cancellation or termination is given by the party proposing cancellation to the other party or until notice has been received that the employer has secured insurance from another insurance company or has otherwise insured the payment of compensation provided for by Massachusetts General Laws Chapter 152 as amended. Notice of cancellation sent to the party proposing cancellation by registered mail, postage prepaid, with a return receipt of the addressee requested, shall be sufficient notice. An affidavit of any officer, agent or employee of insurer or the insured, as the case may be, duly authorized for the purpose, that he has so sent such notice addressed as foresaid, shall be prima facie evidence of the sending thereof as aforesaid. This section shall apply to the legal representatives, trustee in bankruptcy, receiver, assignee, trustee and the successor in interest of any such Contractor.

16.1.4 The aforesaid insurance except that required for traffic officers, shall be taken out and maintained with no compensation therefor other than that provided by the contract unit prices.

16.2 AWARDING AUTHORITY'S DECISIONS ON INTERPRETATION OF SPECIFICATIONS, ETC.; TIME LIMIT; NOTICE

16.2.1 MassDOT (Owner) and MCRR (Railroad) or its Engineer shall make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation or study, Owner and Railroad or its Engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made.

16.3 PUBLIC CONSTRUCTION WORK BY FOREIGN CORPORATIONS – RESTRICTIONS AND REPORTS

16.3.1 Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or of his right, title, or interest therein, without written consent of Engineer. In case such consent is given, Contractor will be permitted to sublet a portion thereof, but shall perform with his own organization, work amounting to not less than 50 percent of the original total Contract price, except that any items designated in the Contract as “specialty items” may be performed by Subcontract and the cost of any such specialty items may be performed by Subcontracts may be deducted from the total cost computing the amount of work required to be performed by Contractor with his own organization. No Subcontractors, or transfer of Contract, shall in any case release Contractor of his liability under the Contract and Bonds.

16.3.2 Contractor shall notify Engineer, as soon as practicable after execution of the Contract, the name and address of each Subcontractor he intends to employ, the portion of the work which the Subcontractor is to do, and such other information Engineer may require in order to ascertain whether Subcontractor is reliable and able to perform the work. Contractor shall not withhold retainage on any subcontract

16.3.3 Contractor shall direct the attention of his Subcontractors to the requirements of:

16.3.3.1 Subsection 7.05 regarding insurances, and also the Minimum Wage Rates and Health and Welfare and Pensions Fund Contributions as determined by the Commission of Labor and Industries of the Commonwealth and also to the provisions of Subsections 7.21 and 7.22, and

16.3.3.2 Chapter 30, General Laws, Section 39L requires (l) that the Commonwealth and every county, city, town, district, board, commission, shall not enter into a Contract for such work with, and shall not approve as a Subcontractor furnishing labor and materials for a part of any such work, a foreign corporation which has not filed with the Department a certificate of the State Secretary stating that such corporation has compiled with Sections 3 and 5 of Chapter 181 and the date of such compliance. Chapter 181, Section 3 requires foreign corporations to appoint the Secretary of the Commonwealth as an attorney for service of process, and Section 5, Chapter 181 requires foreign corporations to file certain documents with the Secretary of State which will permit them to do business in Massachusetts.

16.3.3.3 Contractor shall also direct the attention of his Subcontractors and of all suppliers of material to the requirements of Subsection 5.09 regarding facilities for Engineer’s inspectors.

END OF SECTION

FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

SCHEDULE OF PREVAILING WAGE RATES

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Rail and Transit

Contract Number:

City/Town: BARNSTABLE

Description of Work: Demolish & dispose of existing grade crossing roadway, track, tie & timber; reconstruct track through RR grade crossings; furnish & install rubber railseal. 10 of the 18 xings include signal upgrades.

Job Location: Four MassDOT railroad lines

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (NEW BEDFORD)*	02/01/2022	$57.15	$11.39	$22.34	$0.00	$90.88

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 New Bedford*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.58	$11.39	$22.34	$0.00	$62.31
2	60	$34.29	$11.39	$22.34	$0.00	$68.02
3	70	$40.01	$11.39	$22.34	$0.00	$73.74
4	80	$45.72	$11.39	$22.34	$0.00	$79.45
5	90	$51.44	$11.39	$22.34	$0.00	$85.17

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.33	$9.10	$17.72	$0.00	$69.15
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2022	$44.53	$8.68	$19.97	$0.00	$73.18
	09/01/2022	$45.18	$8.68	$19.97	$0.00	$73.83
	03/01/2023	$45.78	$8.68	$19.97	$0.00	$74.43

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.27	$8.68	$1.73	$0.00	$32.68
2	60	$26.72	$8.68	$1.73	$0.00	$37.13
3	70	$31.17	$8.68	$14.78	$0.00	$54.63
4	75	$33.40	$8.68	$14.78	$0.00	$56.86
5	80	$35.62	$8.68	$16.51	$0.00	$60.81
6	80	$35.62	$8.68	$16.51	$0.00	$60.81
7	90	$40.08	$8.68	$18.24	$0.00	$67.00
8	90	$40.08	$8.68	$18.24	$0.00	$67.00

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.59	$8.68	$1.73	$0.00	$33.00
2	60	$27.11	$8.68	$1.73	$0.00	$37.52
3	70	$31.63	$8.68	$14.78	$0.00	$55.09
4	75	$33.89	$8.68	$14.78	$0.00	$57.35
5	80	$36.14	$8.68	$16.51	$0.00	$61.33
6	80	$36.14	$8.68	$16.51	$0.00	$61.33
7	90	$40.66	$8.68	$18.24	$0.00	$67.58
8	90	$40.66	$8.68	$18.24	$0.00	$67.58

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $30.45/ 3&4 $36.57/ 5&6 $56.36/ 7&8 $62.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17
All Aspects of New Wood Frame Work						

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (NEW BEDFORD)*	01/01/2020	$49.07	$12.75	$22.41	$0.62	$84.85

Apprentice - *CEMENT MASONRY/PLASTERING - Eastern Mass (New Bedford)*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$12.75	$15.41	$0.00	$52.70
2	60	$29.44	$12.75	$17.41	$0.62	$60.22
3	65	$31.90	$12.75	$18.41	$0.62	$63.68
4	70	$34.35	$12.75	$19.41	$0.62	$67.13
5	75	$36.80	$12.75	$20.41	$0.62	$70.58
6	80	$39.26	$12.75	$21.41	$0.62	$74.04
7	90	$44.16	$12.75	$22.41	$0.62	$79.94

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$52.38	$14.00	$16.05	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

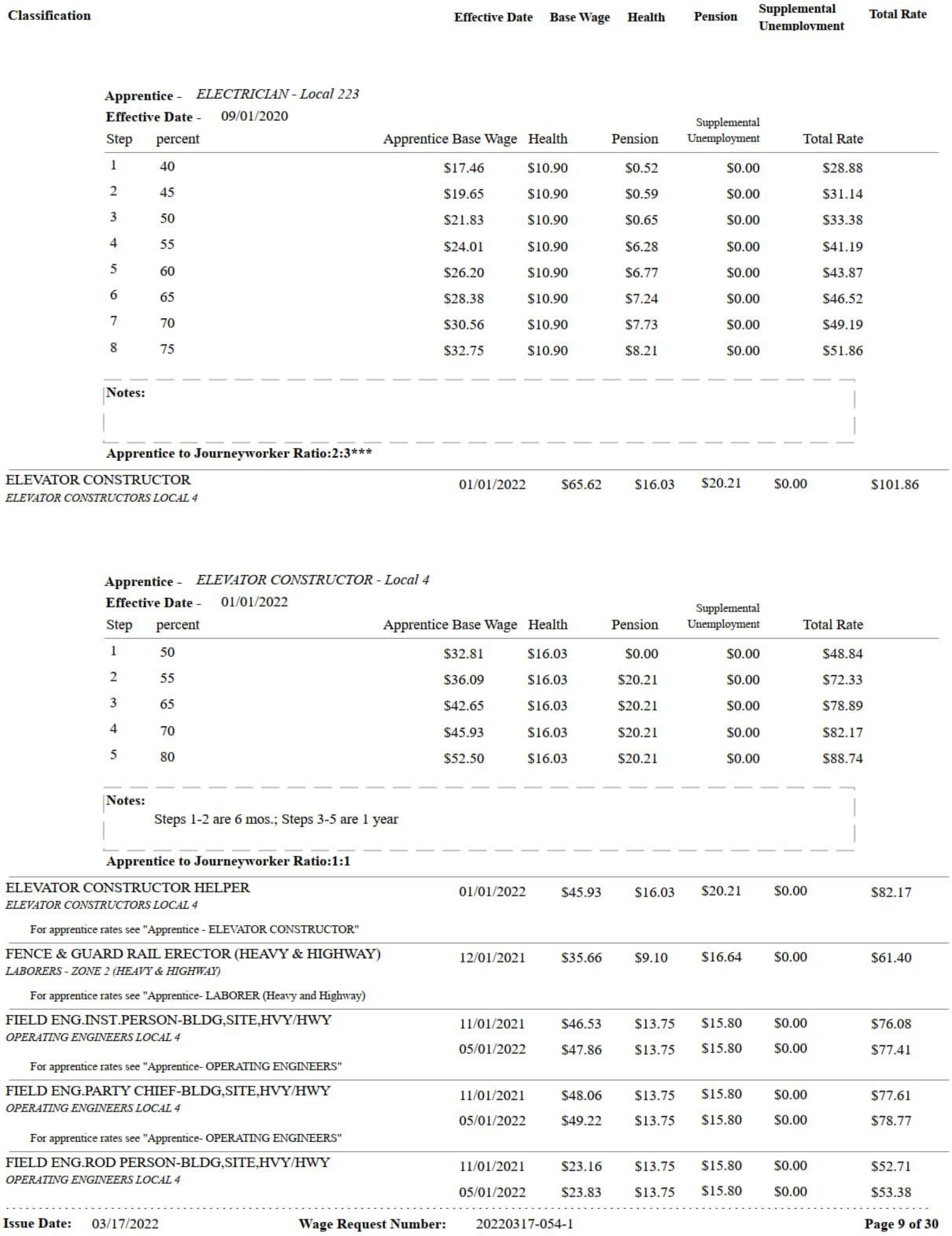
Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 223*
Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.46	$10.90	$0.52	$0.00	$28.88
2	45	$19.65	$10.90	$0.59	$0.00	$31.14
3	50	$21.83	$10.90	$0.65	$0.00	$33.38
4	55	$24.01	$10.90	$6.28	$0.00	$41.19
5	60	$26.20	$10.90	$6.77	$0.00	$43.87
6	65	$28.38	$10.90	$7.24	$0.00	$46.52
7	70	$30.56	$10.90	$7.73	$0.00	$49.19
8	75	$32.75	$10.90	$8.21	$0.00	$51.86

Notes:

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*
Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4* For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$46.53	$13.75	$15.80	$0.00	$76.08
	05/01/2022	$47.86	$13.75	$15.80	$0.00	$77.41
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$48.06	$13.75	$15.80	$0.00	$77.61
	05/01/2022	$49.22	$13.75	$15.80	$0.00	$78.77
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2021	$23.16	$13.75	$15.80	$0.00	$52.71
	05/01/2022	$23.83	$13.75	$15.80	$0.00	$53.38

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- ELECTRICIAN"	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$41.76	$14.00	$16.05	$0.00	$71.81
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$24.50	$9.10	$16.64	$0.00	$50.24
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE II*	03/01/2022	$47.62	$8.68	$20.27	$0.00	$76.57

Apprentice - *FLOORCOVERER - Local 2168 Zone II*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.81	$8.68	$1.79	$0.00	$34.28
2	55	$26.19	$8.68	$1.79	$0.00	$36.66
3	60	$28.57	$8.68	$14.90	$0.00	$52.15
4	65	$30.95	$8.68	$14.90	$0.00	$54.53
5	70	$33.33	$8.68	$16.69	$0.00	$58.70
6	75	$35.72	$8.68	$16.69	$0.00	$61.09
7	80	$38.10	$8.68	$18.48	$0.00	$65.26
8	85	$40.48	$8.68	$18.48	$0.00	$67.64

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $31.90/ 3&4 $38.39/ 5&6 $58.70/ 7&8 $65.26

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 1333*	06/01/2020	$39.18	$10.80	$10.45	$0.00	$60.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 1333*
Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.59	$10.80	$1.80	$0.00	$32.19
2	56	$22.04	$10.80	$1.80	$0.00	$34.64
3	63	$24.49	$10.80	$2.45	$0.00	$37.74
4	69	$26.94	$10.80	$2.45	$0.00	$40.19
5	75	$29.39	$10.80	$3.15	$0.00	$43.34
6	81	$31.83	$10.80	$3.15	$0.00	$45.78
7	88	$34.28	$10.80	$10.45	$0.00	$55.53
8	94	$36.73	$10.80	$10.45	$0.00	$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43

Apprentice - *OPERATING ENGINEERS - Local 4*
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.26	$14.00	$0.00	$0.00	$42.26
2	60	$30.83	$14.00	$16.05	$0.00	$60.88
3	65	$33.40	$14.00	$16.05	$0.00	$63.45
4	70	$35.97	$14.00	$16.05	$0.00	$66.02
5	75	$38.54	$14.00	$16.05	$0.00	$68.59
6	80	$41.10	$14.00	$16.05	$0.00	$71.15
7	85	$43.67	$14.00	$16.05	$0.00	$73.72
8	90	$46.24	$14.00	$16.05	$0.00	$76.29

Notes:

Apprentice to Journeyworker Ratio:1:6

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - B*	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - B*	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80
For apprentice rates see "Apprentice- SHEET METAL WORKER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC MECHANIC *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	09/01/2021	$46.50	$13.80	$17.14	$0.00	$77.44
	09/01/2022	$48.95	$13.80	$17.14	$0.00	$79.89

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Southern MA*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.25	$13.80	$12.42	$0.00	$49.47
2	60	$27.90	$13.80	$13.36	$0.00	$55.06
3	70	$32.55	$13.80	$14.31	$0.00	$60.66
4	80	$37.20	$13.80	$15.25	$0.00	$66.25

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.48	$13.80	$12.42	$0.00	$50.70
2	60	$29.37	$13.80	$13.36	$0.00	$56.53
3	70	$34.27	$13.80	$14.31	$0.00	$62.38
4	80	$39.16	$13.80	$15.25	$0.00	$68.21

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 37*	03/16/2021	$42.46	$7.70	$17.10	$0.00	$67.26

Apprentice - *IRONWORKER - Local 37*

Effective Date - 03/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	$29.72	$7.70	$17.10	$0.00	$54.52
2	75	$31.85	$7.70	$17.10	$0.00	$56.65
3	80	$33.97	$7.70	$17.10	$0.00	$58.77
4	85	$36.09	$7.70	$17.10	$0.00	$60.89
5	90	$38.21	$7.70	$17.10	$0.00	$63.01
6	95	$40.34	$7.70	$17.10	$0.00	$65.14

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2021

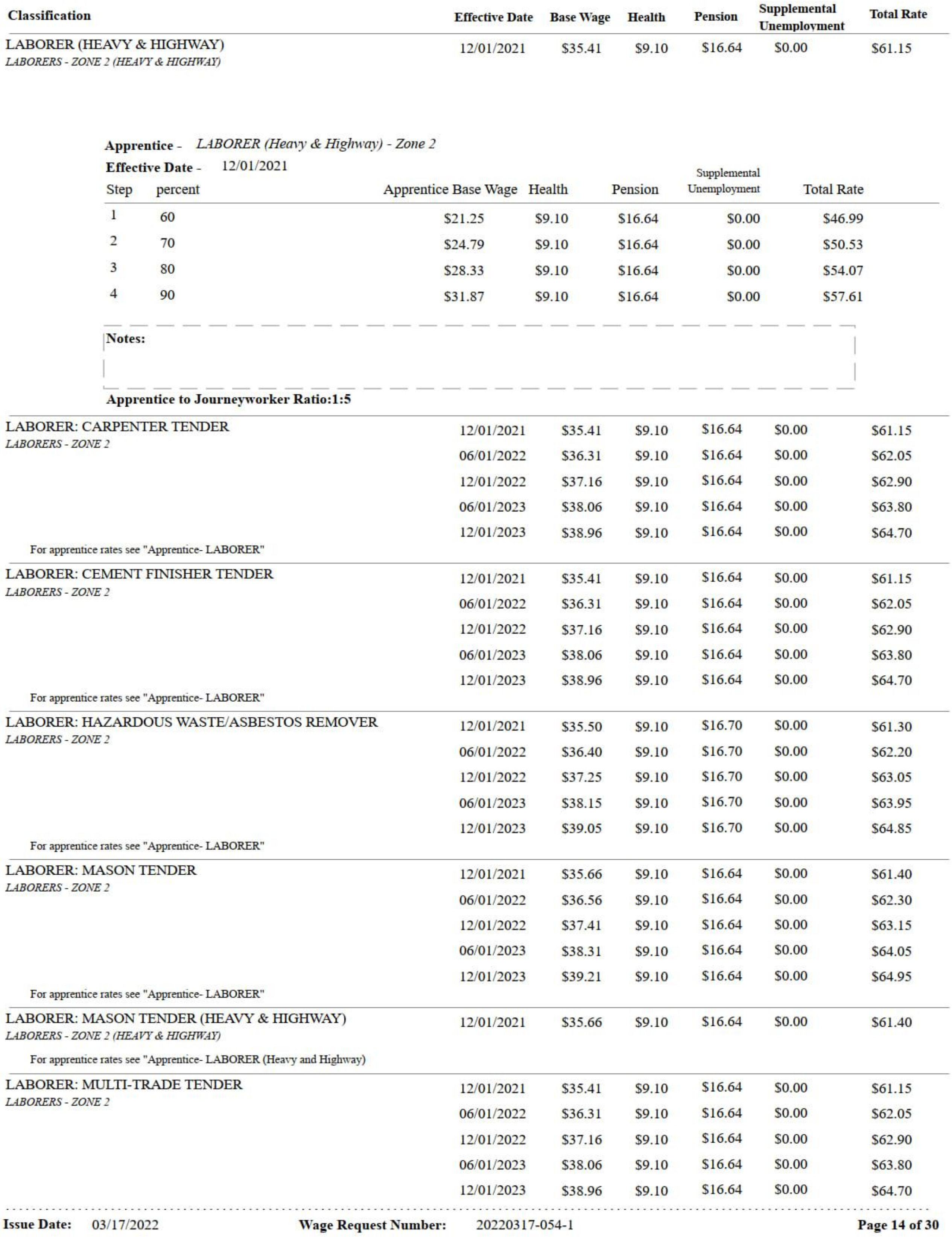
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Effective Date - 06/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.79	$9.10	$16.64	$0.00	$47.53
2	70	$25.42	$9.10	$16.64	$0.00	$51.16
3	80	$29.05	$9.10	$16.64	$0.00	$54.79
4	90	$32.68	$9.10	$16.64	$0.00	$58.42

Notes:

Apprentice to Journeyworker Ratio:1:5



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.50	$9.10	$16.70	$0.00	$61.30
	06/01/2022	$36.40	$9.10	$16.70	$0.00	$62.20
	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$43.69	$11.39	$20.37	$0.00	$75.45

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.37	$0.00	$53.61
2	60	$26.21	$11.39	$20.37	$0.00	$57.97
3	70	$30.58	$11.39	$20.37	$0.00	$62.34
4	80	$34.95	$11.39	$20.37	$0.00	$66.71
5	90	$39.32	$11.39	$20.37	$0.00	$71.08

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$57.17	$11.39	$22.31	$0.00	$90.87

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.31	$0.00	$62.29
2	60	$34.30	$11.39	$22.31	$0.00	$68.00
3	70	$40.02	$11.39	$22.31	$0.00	$73.72
4	80	$45.74	$11.39	$22.31	$0.00	$79.44
5	90	$51.45	$11.39	$22.31	$0.00	$85.15

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/03/2022	$40.67	$8.58	$21.57	$0.00	$70.82
	01/02/2023	$41.92	$8.58	$21.57	$0.00	$72.07

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.37	$8.58	$5.72	$0.00	$36.67
2	65	$26.44	$8.58	$17.93	$0.00	$52.95
3	75	$30.50	$8.58	$18.98	$0.00	$58.06
4	85	$34.57	$8.58	$20.01	$0.00	$63.16

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.06	$8.58	$5.72	$0.00	$37.36
2	65	$27.25	$8.58	$17.93	$0.00	$53.76
3	75	$31.44	$8.58	$18.98	$0.00	$59.00
4	85	$35.63	$8.58	$20.01	$0.00	$64.22

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$23.48	$14.00	$16.05	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$28.44	$14.00	$16.05	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$44.56	$8.65	$23.05	$0.00	$76.26
	07/01/2022	$45.76	$8.65	$23.05	$0.00	$77.46
	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.28	$8.65	$0.00	$0.00	$30.93
2	55	$24.51	$8.65	$6.27	$0.00	$39.43
3	60	$26.74	$8.65	$6.84	$0.00	$42.23
4	65	$28.96	$8.65	$7.41	$0.00	$45.02
5	70	$31.19	$8.65	$19.63	$0.00	$59.47
6	75	$33.42	$8.65	$20.20	$0.00	$62.27
7	80	$35.65	$8.65	$20.77	$0.00	$65.07
8	90	$40.10	$8.65	$21.91	$0.00	$70.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$8.65	$0.00	$0.00	$31.53
2	55	$25.17	$8.65	$6.27	$0.00	$40.09
3	60	$27.46	$8.65	$6.84	$0.00	$42.95
4	65	$29.74	$8.65	$7.41	$0.00	$45.80
5	70	$32.03	$8.65	$19.63	$0.00	$60.31
6	75	$34.32	$8.65	$20.20	$0.00	$63.17
7	80	$36.61	$8.65	$20.77	$0.00	$66.03
8	90	$41.18	$8.65	$21.91	$0.00	$71.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$42.62	$8.65	$23.05	$0.00	$74.32
	07/01/2022	$43.82	$8.65	$23.05	$0.00	$75.52
	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.31	$8.65	$0.00	$0.00	$29.96
2	55	$23.44	$8.65	$6.27	$0.00	$38.36
3	60	$25.57	$8.65	$6.84	$0.00	$41.06
4	65	$27.70	$8.65	$7.41	$0.00	$43.76
5	70	$29.83	$8.65	$19.63	$0.00	$58.11
6	75	$31.97	$8.65	$20.20	$0.00	$60.82
7	80	$34.10	$8.65	$20.77	$0.00	$63.52
8	90	$38.36	$8.65	$21.91	$0.00	$68.92

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$8.65	$0.00	$0.00	$30.56
2	55	$24.10	$8.65	$6.27	$0.00	$39.02
3	60	$26.29	$8.65	$6.84	$0.00	$41.78
4	65	$28.48	$8.65	$7.41	$0.00	$44.54
5	70	$30.67	$8.65	$19.63	$0.00	$58.95
6	75	$32.87	$8.65	$20.20	$0.00	$61.72
7	80	$35.06	$8.65	$20.77	$0.00	$64.48
8	90	$39.44	$8.65	$21.91	$0.00	$70.00

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$41.22	$8.65	$23.05	$0.00	$72.92
	07/01/2022	$42.42	$8.65	$23.05	$0.00	$74.12
	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.61	$8.65	$0.00	$0.00	$29.26
2	55	$22.67	$8.65	$6.27	$0.00	$37.59
3	60	$24.73	$8.65	$6.84	$0.00	$40.22
4	65	$26.79	$8.65	$7.41	$0.00	$42.85
5	70	$28.85	$8.65	$19.63	$0.00	$57.13
6	75	$30.92	$8.65	$20.20	$0.00	$59.77
7	80	$32.98	$8.65	$20.77	$0.00	$62.40
8	90	$37.10	$8.65	$21.91	$0.00	$67.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.21	$8.65	$0.00	$0.00	$29.86
2	55	$23.33	$8.65	$6.27	$0.00	$38.25
3	60	$25.45	$8.65	$6.84	$0.00	$40.94
4	65	$27.57	$8.65	$7.41	$0.00	$43.63
5	70	$29.69	$8.65	$19.63	$0.00	$57.97
6	75	$31.82	$8.65	$20.20	$0.00	$60.67
7	80	$33.94	$8.65	$20.77	$0.00	$63.36
8	90	$38.18	$8.65	$21.91	$0.00	$68.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 2)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 2*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: Apprentice wages shall be no less than the following Steps;
(Same as set in Zone 1)
1$57.06/2$61.96/3$66.87/4$69.32/5$71.78/6$71.78/7$76.68/8$76.68

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PLUMBER & PIPEFITTER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

Apprentice - *PLUMBER/PIPEFITTER - Local 51*

Effective Date - 08/30/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.60	$10.15	$2.50	$0.00	$31.25
2	50	$23.25	$10.15	$2.50	$0.00	$35.90
3	60	$27.89	$10.15	$8.80	$0.00	$46.84
4	70	$32.54	$10.15	$14.08	$0.00	$56.77
5	80	$37.19	$10.15	$17.60	$0.00	$64.94

Notes:
Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

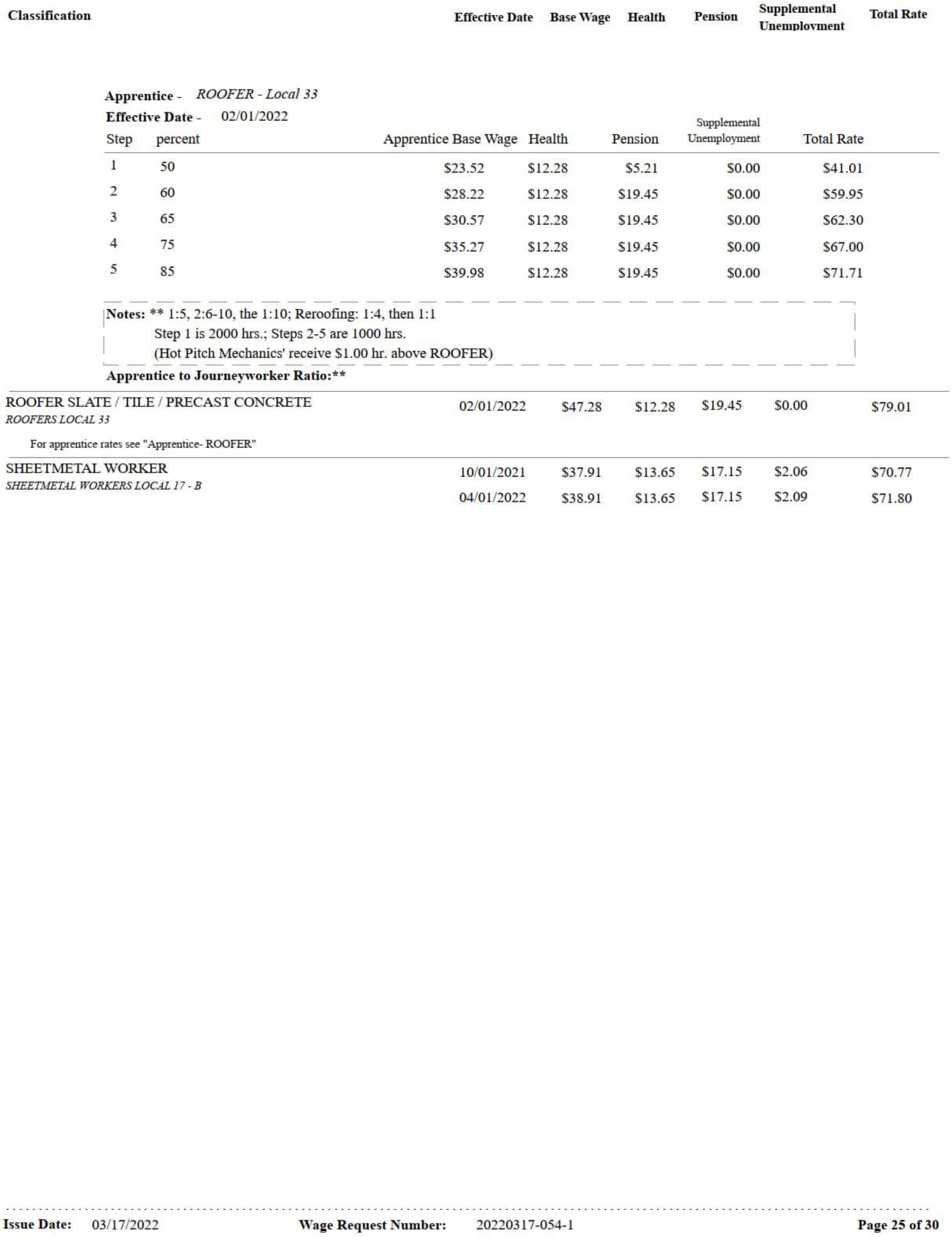
Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
	06/01/2022	$37.31	$9.10	$16.64	$0.00	$63.05
	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 653 - Southeastern Concrete (Weymouth)*	08/01/2021	$24.00	$12.91	$6.90	$0.00	$43.81
	05/01/2022	$24.50	$12.91	$6.90	$0.00	$44.31
	08/01/2022	$24.50	$13.41	$6.90	$0.00	$44.81
	05/01/2023	$25.00	$13.41	$6.90	$0.00	$45.31
	08/01/2023	$25.00	$13.91	$6.90	$0.00	$45.81
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Dampproofg) *ROOFERS LOCAL 33*	02/01/2022	$47.03	$12.28	$19.45	$0.00	$78.76



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.52	$12.28	$5.21	$0.00	$41.01
2	60	$28.22	$12.28	$19.45	$0.00	$59.95
3	65	$30.57	$12.28	$19.45	$0.00	$62.30
4	75	$35.27	$12.28	$19.45	$0.00	$67.00
5	85	$39.98	$12.28	$19.45	$0.00	$71.71

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2022	$47.28	$12.28	$19.45	$0.00	$79.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - B*	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80

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Apprentice - *SHEET METAL WORKER - Local 17-B*

Effective Date - 10/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$15.16	$13.65	$4.02	$0.98	$33.81
2	45	$17.06	$13.65	$4.52	$1.06	$36.29
3	50	$18.96	$13.65	$11.08	$1.31	$45.00
4	55	$20.85	$13.65	$11.08	$1.37	$46.95
5	60	$22.75	$13.65	$14.12	$1.52	$52.04
6	65	$24.64	$13.65	$14.38	$1.58	$54.25
7	70	$26.54	$13.65	$14.63	$1.64	$56.46
8	75	$28.43	$13.65	$14.88	$1.71	$58.67
9	80	$30.33	$13.65	$15.14	$1.77	$60.89
10	85	$32.22	$13.65	$15.39	$1.84	$63.10

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$15.56	$13.65	$4.02	$1.00	$34.23
2	45	$17.51	$13.65	$4.52	$1.07	$36.75
3	50	$19.46	$13.65	$11.08	$1.33	$45.52
4	55	$21.40	$13.65	$11.08	$1.38	$47.51
5	60	$23.35	$13.65	$14.12	$1.53	$52.65
6	65	$25.29	$13.65	$14.38	$1.60	$54.92
7	70	$27.24	$13.65	$14.63	$1.67	$57.19
8	75	$29.18	$13.65	$14.88	$1.73	$59.44
9	80	$31.13	$13.65	$15.14	$1.80	$61.72
10	85	$33.07	$13.65	$15.39	$1.86	$63.97

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section B) Zone 2*	03/01/2022	$57.92	$10.44	$22.10	$0.00	$90.46
	10/01/2022	$59.45	$10.44	$22.10	$0.00	$91.99
	03/01/2023	$60.98	$10.44	$22.10	$0.00	$93.52
	10/01/2023	$62.56	$10.44	$22.10	$0.00	$95.10
	03/01/2024	$64.18	$10.44	$22.10	$0.00	$96.72
	10/01/2024	$65.80	$10.44	$22.10	$0.00	$98.34
	03/01/2025	$67.42	$10.44	$22.10	$0.00	$99.96

Apprentice - *SPRINKLER FITTER - Local 550 (Section B) Zone 2*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$20.27	$10.44	$12.35	$0.00	$43.06
2	40	$23.17	$10.44	$13.10	$0.00	$46.71
3	45	$26.06	$10.44	$13.85	$0.00	$50.35
4	50	$28.96	$10.44	$14.60	$0.00	$54.00
5	55	$31.86	$10.44	$15.35	$0.00	$57.65
6	60	$34.75	$10.44	$16.10	$0.00	$61.29
7	65	$37.65	$10.44	$16.85	$0.00	$64.94
8	70	$40.54	$10.44	$17.60	$0.00	$68.58
9	75	$43.44	$10.44	$18.35	$0.00	$72.23
10	80	$46.34	$10.44	$19.10	$0.00	$75.88

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$20.81	$10.44	$12.35	$0.00	$43.60
2	40	$23.78	$10.44	$13.10	$0.00	$47.32
3	45	$26.75	$10.44	$13.85	$0.00	$51.04
4	50	$29.73	$10.44	$14.60	$0.00	$54.77
5	55	$32.70	$10.44	$15.35	$0.00	$58.49
6	60	$35.67	$10.44	$16.10	$0.00	$62.21
7	65	$38.64	$10.44	$16.85	$0.00	$65.93
8	70	$41.62	$10.44	$17.60	$0.00	$69.66
9	75	$44.59	$10.44	$18.35	$0.00	$73.38
10	80	$47.56	$10.44	$19.10	$0.00	$77.10

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 223*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$56.09	$11.39	$22.34	$0.00	$89.82

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

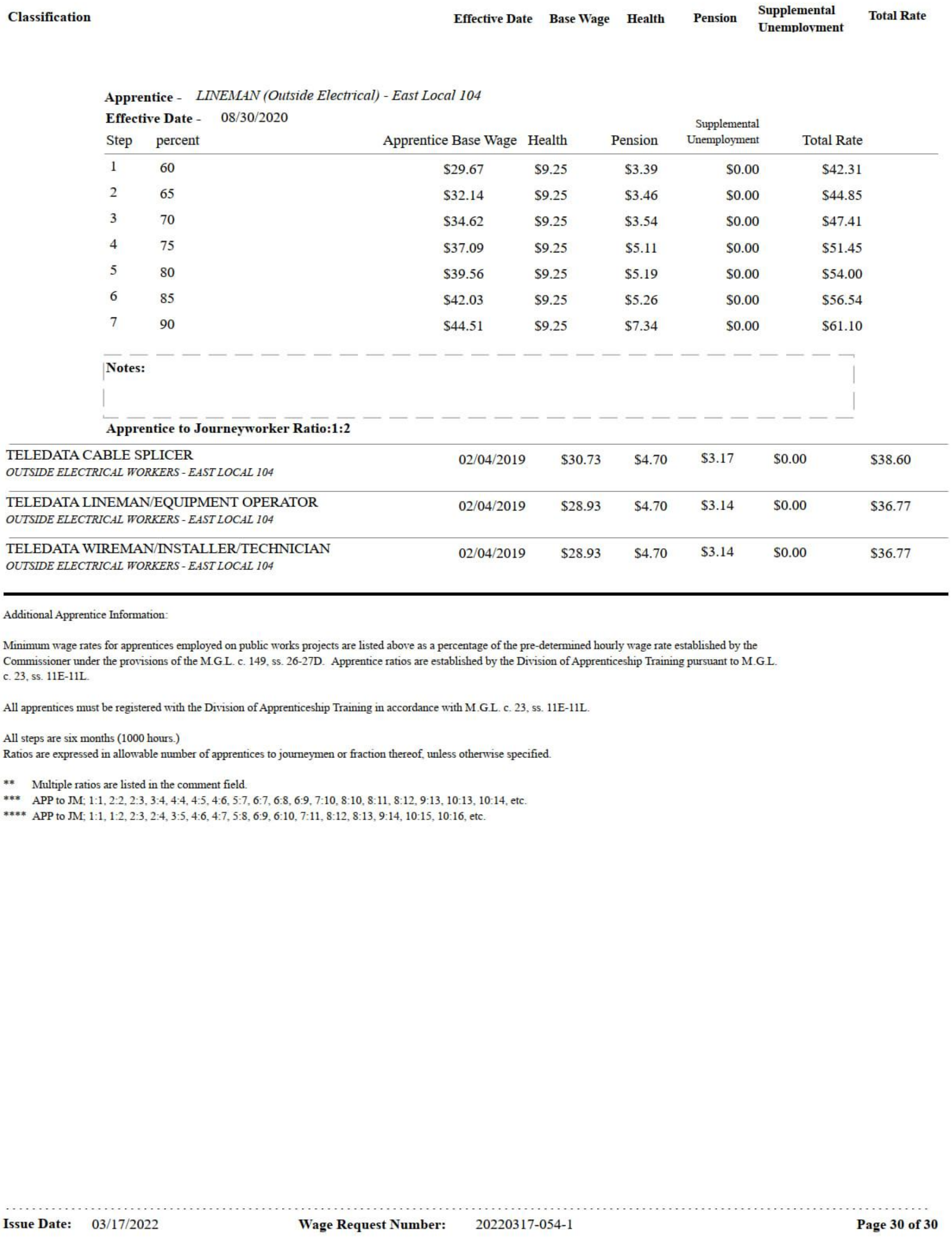
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.34	$0.00	$61.78
2	60	$33.65	$11.39	$22.34	$0.00	$67.38
3	70	$39.26	$11.39	$22.34	$0.00	$72.99
4	80	$44.87	$11.39	$22.34	$0.00	$78.60
5	90	$50.48	$11.39	$22.34	$0.00	$84.21

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.58	$9.10	$17.72	$0.00	$69.40
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.30	$9.10	$17.72	$0.00	$68.12
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$53.41	$9.10	$18.17	$0.00	$80.68
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$55.41	$9.10	$18.17	$0.00	$82.68
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$45.48	$9.10	$18.17	$0.00	$72.75

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2021	$47.48	$9.10	$18.17	$0.00	$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18



Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

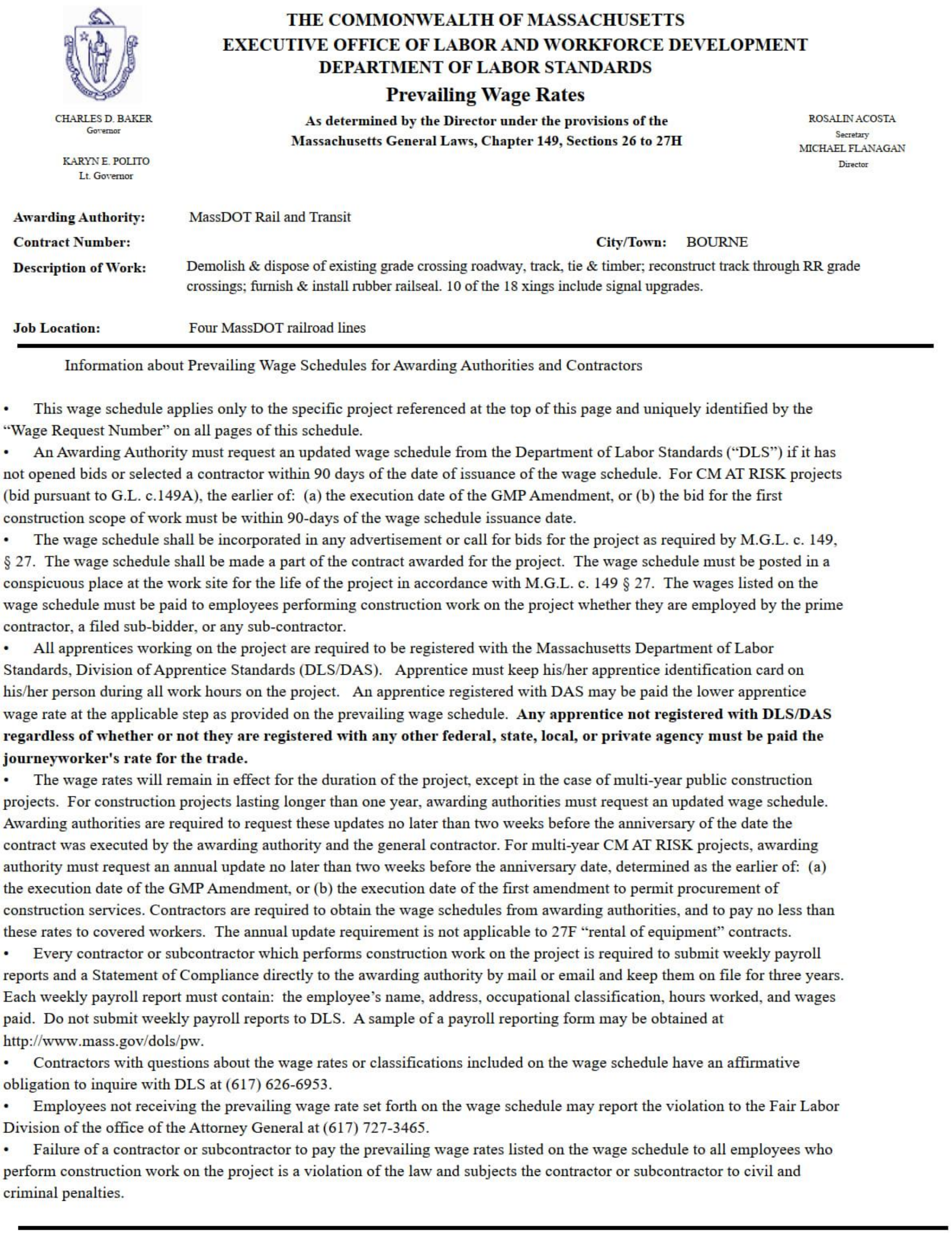
Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS
Prevailing Wage Rates

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Rail and Transit

Contract Number: **City/Town:** BOURNE

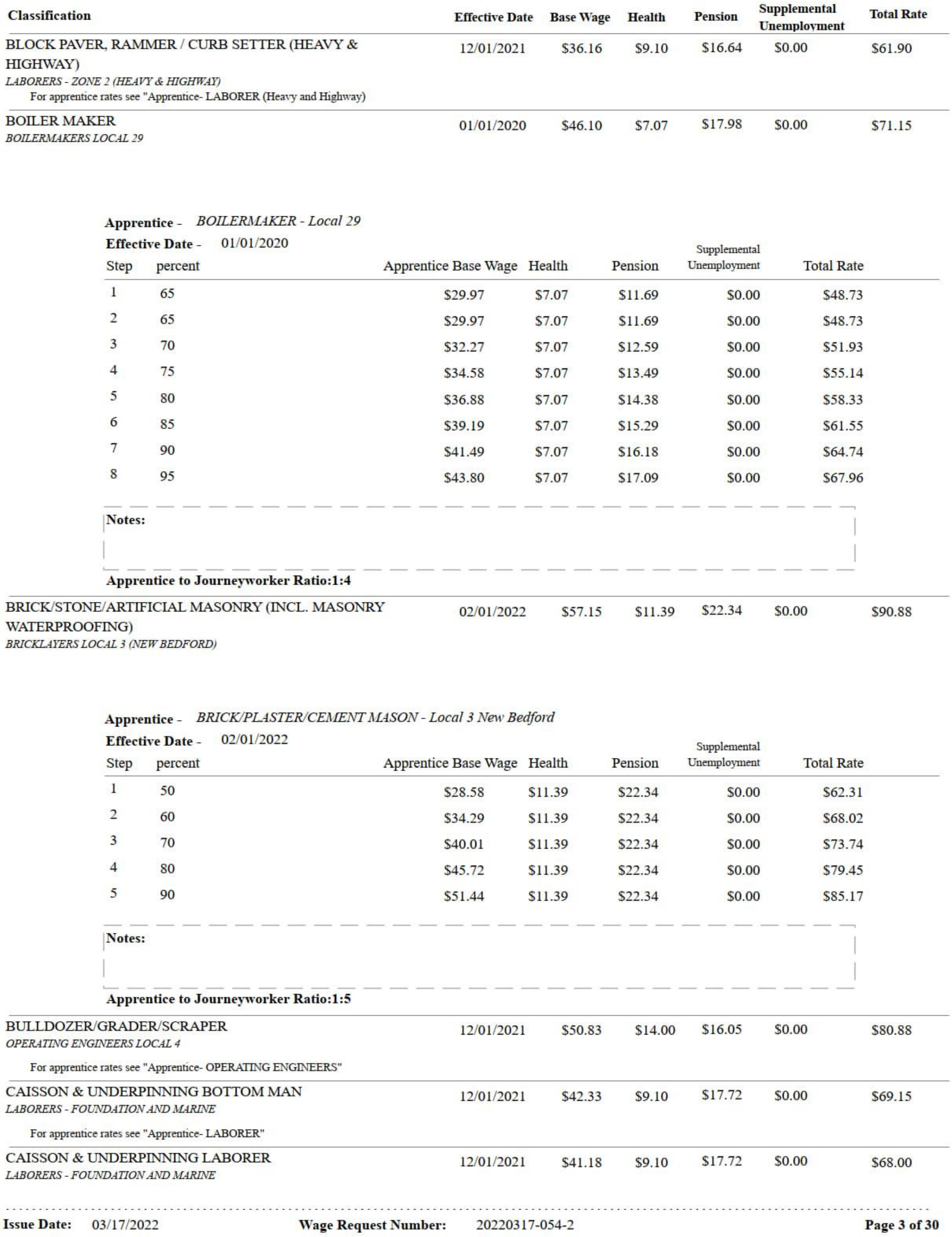
Description of Work: Demolish & dispose of existing grade crossing roadway, track, tie & timber; reconstruct track through RR grade crossings; furnish & install rubber railseal. 10 of the 18 xings include signal upgrades.

Job Location: Four MassDOT railroad lines

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the “Wage Request Number” on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards (“DLS”) if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F “rental of equipment” contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee’s name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (NEW BEDFORD)*	02/01/2022	$57.15	$11.39	$22.34	$0.00	$90.88

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 New Bedford*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.58	$11.39	$22.34	$0.00	$62.31
2	60	$34.29	$11.39	$22.34	$0.00	$68.02
3	70	$40.01	$11.39	$22.34	$0.00	$73.74
4	80	$45.72	$11.39	$22.34	$0.00	$79.45
5	90	$51.44	$11.39	$22.34	$0.00	$85.17

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.33	$9.10	$17.72	$0.00	$69.15
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2022	$44.53	$8.68	$19.97	$0.00	$73.18
	09/01/2022	$45.18	$8.68	$19.97	$0.00	$73.83
	03/01/2023	$45.78	$8.68	$19.97	$0.00	$74.43

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.27	$8.68	$1.73	$0.00	$32.68
2	60	$26.72	$8.68	$1.73	$0.00	$37.13
3	70	$31.17	$8.68	$14.78	$0.00	$54.63
4	75	$33.40	$8.68	$14.78	$0.00	$56.86
5	80	$35.62	$8.68	$16.51	$0.00	$60.81
6	80	$35.62	$8.68	$16.51	$0.00	$60.81
7	90	$40.08	$8.68	$18.24	$0.00	$67.00
8	90	$40.08	$8.68	$18.24	$0.00	$67.00

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.59	$8.68	$1.73	$0.00	$33.00
2	60	$27.11	$8.68	$1.73	$0.00	$37.52
3	70	$31.63	$8.68	$14.78	$0.00	$55.09
4	75	$33.89	$8.68	$14.78	$0.00	$57.35
5	80	$36.14	$8.68	$16.51	$0.00	$61.33
6	80	$36.14	$8.68	$16.51	$0.00	$61.33
7	90	$40.66	$8.68	$18.24	$0.00	$67.58
8	90	$40.66	$8.68	$18.24	$0.00	$67.58

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $30.45/ 3&4 $36.57/ 5&6 $56.36/ 7&8 $62.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17
All Aspects of New Wood Frame Work						

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (NEW BEDFORD)*	01/01/2020	$49.07	$12.75	$22.41	$0.62	$84.85

Apprentice - *CEMENT MASONRY/PLASTERING - Eastern Mass (New Bedford)*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$12.75	$15.41	$0.00	$52.70
2	60	$29.44	$12.75	$17.41	$0.62	$60.22
3	65	$31.90	$12.75	$18.41	$0.62	$63.68
4	70	$34.35	$12.75	$19.41	$0.62	$67.13
5	75	$36.80	$12.75	$20.41	$0.62	$70.58
6	80	$39.26	$12.75	$21.41	$0.62	$74.04
7	90	$44.16	$12.75	$22.41	$0.62	$79.94

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$52.38	$14.00	$16.05	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

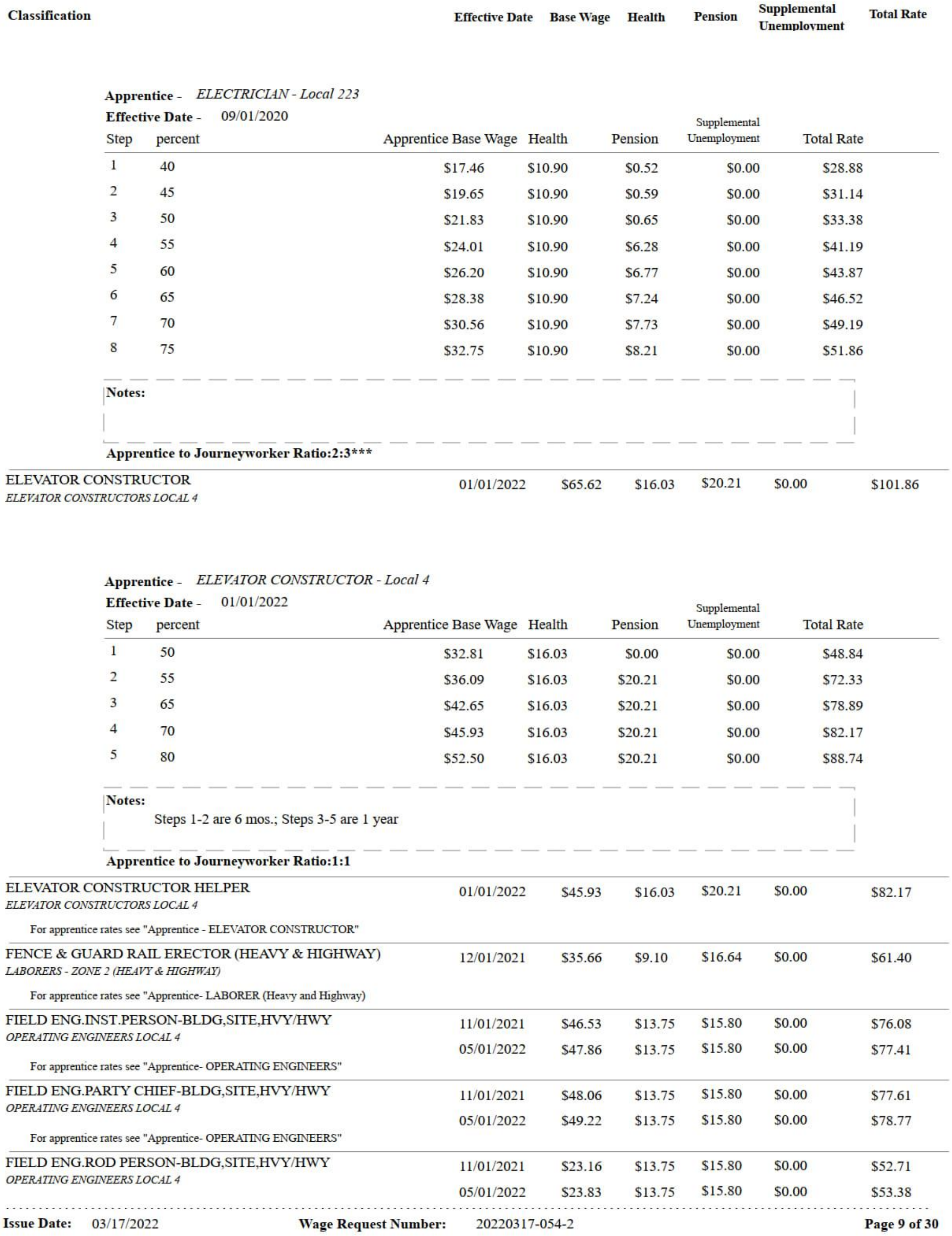
Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 223*
Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.46	$10.90	$0.52	$0.00	$28.88
2	45	$19.65	$10.90	$0.59	$0.00	$31.14
3	50	$21.83	$10.90	$0.65	$0.00	$33.38
4	55	$24.01	$10.90	$6.28	$0.00	$41.19
5	60	$26.20	$10.90	$6.77	$0.00	$43.87
6	65	$28.38	$10.90	$7.24	$0.00	$46.52
7	70	$30.56	$10.90	$7.73	$0.00	$49.19
8	75	$32.75	$10.90	$8.21	$0.00	$51.86

Notes:

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*
Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2021	$46.53	$13.75	$15.80	$0.00	$76.08
	05/01/2022	$47.86	$13.75	$15.80	$0.00	$77.41
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2021	$48.06	$13.75	$15.80	$0.00	$77.61
	05/01/2022	$49.22	$13.75	$15.80	$0.00	$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2021	$23.16	$13.75	$15.80	$0.00	$52.71
	05/01/2022	$23.83	$13.75	$15.80	$0.00	$53.38

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- ELECTRICIAN"	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$41.76	$14.00	$16.05	$0.00	$71.81
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$24.50	$9.10	$16.64	$0.00	$50.24
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE II*	03/01/2022	$47.62	$8.68	$20.27	$0.00	$76.57

Apprentice - *FLOORCOVERER - Local 2168 Zone II*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.81	$8.68	$1.79	$0.00	$34.28
2	55	$26.19	$8.68	$1.79	$0.00	$36.66
3	60	$28.57	$8.68	$14.90	$0.00	$52.15
4	65	$30.95	$8.68	$14.90	$0.00	$54.53
5	70	$33.33	$8.68	$16.69	$0.00	$58.70
6	75	$35.72	$8.68	$16.69	$0.00	$61.09
7	80	$38.10	$8.68	$18.48	$0.00	$65.26
8	85	$40.48	$8.68	$18.48	$0.00	$67.64

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $31.90/ 3&4 $38.39/ 5&6 $58.70/ 7&8 $65.26

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 1333*	06/01/2020	$39.18	$10.80	$10.45	$0.00	$60.43

Apprentice - *GLAZIER - Local 1333*
Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.59	$10.80	$1.80	$0.00	$32.19
2	56	$22.04	$10.80	$1.80	$0.00	$34.64
3	63	$24.49	$10.80	$2.45	$0.00	$37.74
4	69	$26.94	$10.80	$2.45	$0.00	$40.19
5	75	$29.39	$10.80	$3.15	$0.00	$43.34
6	81	$31.83	$10.80	$3.15	$0.00	$45.78
7	88	$34.28	$10.80	$10.45	$0.00	$55.53
8	94	$36.73	$10.80	$10.45	$0.00	$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43

Apprentice - *OPERATING ENGINEERS - Local 4*
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.26	$14.00	$0.00	$0.00	$42.26
2	60	$30.83	$14.00	$16.05	$0.00	$60.88
3	65	$33.40	$14.00	$16.05	$0.00	$63.45
4	70	$35.97	$14.00	$16.05	$0.00	$66.02
5	75	$38.54	$14.00	$16.05	$0.00	$68.59
6	80	$41.10	$14.00	$16.05	$0.00	$71.15
7	85	$43.67	$14.00	$16.05	$0.00	$73.72
8	90	$46.24	$14.00	$16.05	$0.00	$76.29

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - B*	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - B*	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80
For apprentice rates see "Apprentice- SHEET METAL WORKER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	09/01/2021	$46.50	$13.80	$17.14	$0.00	$77.44
	09/01/2022	$48.95	$13.80	$17.14	$0.00	$79.89

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Southern MA*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.25	$13.80	$12.42	$0.00	$49.47
2	60	$27.90	$13.80	$13.36	$0.00	$55.06
3	70	$32.55	$13.80	$14.31	$0.00	$60.66
4	80	$37.20	$13.80	$15.25	$0.00	$66.25

Effective Date - 09/01/2022

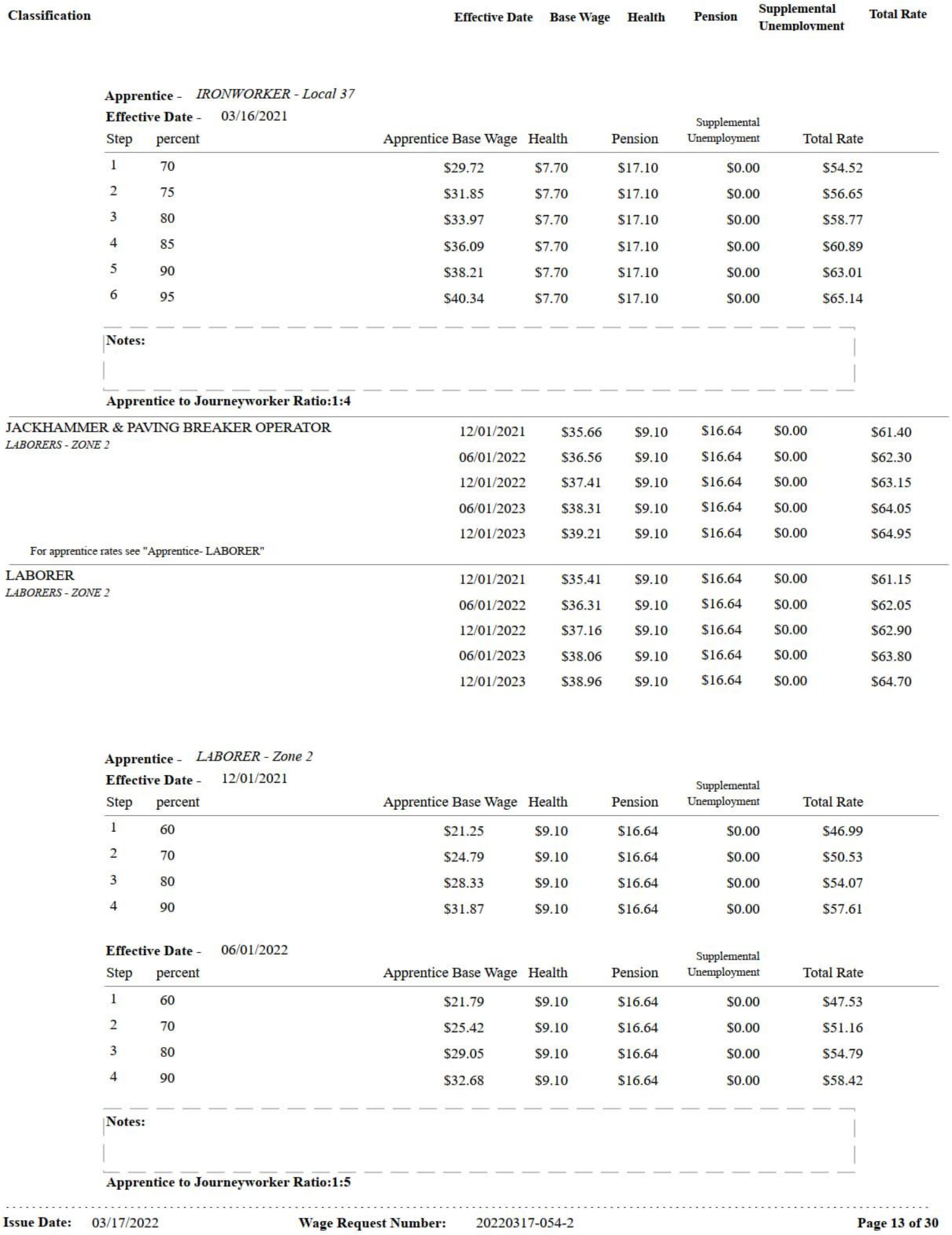
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.48	$13.80	$12.42	$0.00	$50.70
2	60	$29.37	$13.80	$13.36	$0.00	$56.53
3	70	$34.27	$13.80	$14.31	$0.00	$62.38
4	80	$39.16	$13.80	$15.25	$0.00	$68.21

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 37*	03/16/2021	$42.46	$7.70	$17.10	$0.00	$67.26



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 37*

Effective Date - 03/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	$29.72	$7.70	$17.10	$0.00	$54.52
2	75	$31.85	$7.70	$17.10	$0.00	$56.65
3	80	$33.97	$7.70	$17.10	$0.00	$58.77
4	85	$36.09	$7.70	$17.10	$0.00	$60.89
5	90	$38.21	$7.70	$17.10	$0.00	$63.01
6	95	$40.34	$7.70	$17.10	$0.00	$65.14

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Effective Date - 06/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.79	$9.10	$16.64	$0.00	$47.53
2	70	$25.42	$9.10	$16.64	$0.00	$51.16
3	80	$29.05	$9.10	$16.64	$0.00	$54.79
4	90	$32.68	$9.10	$16.64	$0.00	$58.42

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

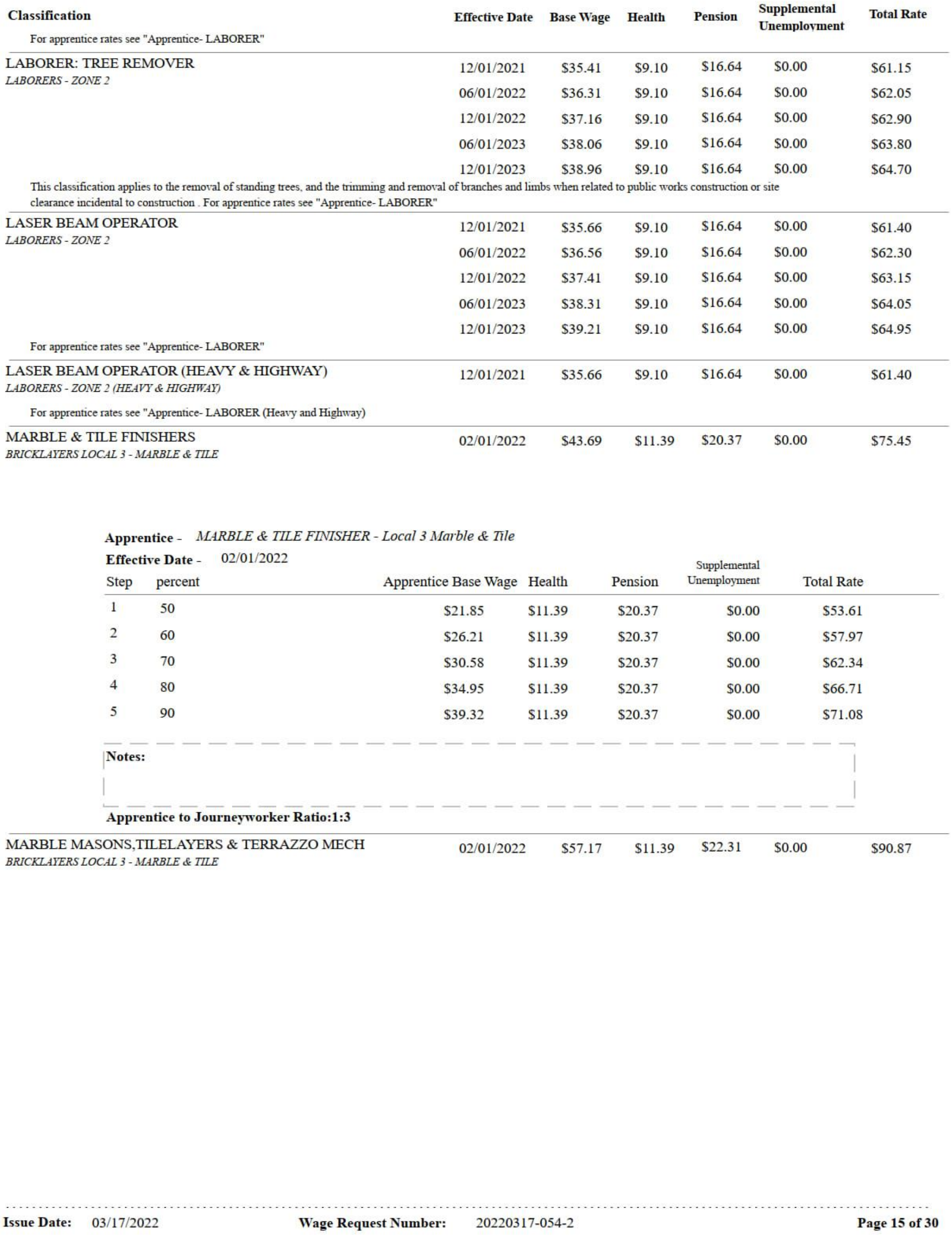
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.50	$9.10	$16.70	$0.00	$61.30
	06/01/2022	$36.40	$9.10	$16.70	$0.00	$62.20
	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$43.69	$11.39	$20.37	$0.00	$75.45

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.37	$0.00	$53.61
2	60	$26.21	$11.39	$20.37	$0.00	$57.97
3	70	$30.58	$11.39	$20.37	$0.00	$62.34
4	80	$34.95	$11.39	$20.37	$0.00	$66.71
5	90	$39.32	$11.39	$20.37	$0.00	$71.08

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$57.17	$11.39	$22.31	$0.00	$90.87

Issue Date: 03/17/2022 **Wage Request Number:** 20220317-054-2 **Page 15 of 30**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.31	$0.00	$62.29
2	60	$34.30	$11.39	$22.31	$0.00	$68.00
3	70	$40.02	$11.39	$22.31	$0.00	$73.72
4	80	$45.74	$11.39	$22.31	$0.00	$79.44
5	90	$51.45	$11.39	$22.31	$0.00	$85.15

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/03/2022	$40.67	$8.58	$21.57	$0.00	$70.82
	01/02/2023	$41.92	$8.58	$21.57	$0.00	$72.07

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.37	$8.58	$5.72	$0.00	$36.67
2	65	$26.44	$8.58	$17.93	$0.00	$52.95
3	75	$30.50	$8.58	$18.98	$0.00	$58.06
4	85	$34.57	$8.58	$20.01	$0.00	$63.16

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.06	$8.58	$5.72	$0.00	$37.36
2	65	$27.25	$8.58	$17.93	$0.00	$53.76
3	75	$31.44	$8.58	$18.98	$0.00	$59.00
4	85	$35.63	$8.58	$20.01	$0.00	$64.22

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$23.48	$14.00	$16.05	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$28.44	$14.00	$16.05	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$44.56	$8.65	$23.05	$0.00	$76.26
	07/01/2022	$45.76	$8.65	$23.05	$0.00	$77.46
	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.28	$8.65	$0.00	$0.00	$30.93
2	55	$24.51	$8.65	$6.27	$0.00	$39.43
3	60	$26.74	$8.65	$6.84	$0.00	$42.23
4	65	$28.96	$8.65	$7.41	$0.00	$45.02
5	70	$31.19	$8.65	$19.63	$0.00	$59.47
6	75	$33.42	$8.65	$20.20	$0.00	$62.27
7	80	$35.65	$8.65	$20.77	$0.00	$65.07
8	90	$40.10	$8.65	$21.91	$0.00	$70.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$8.65	$0.00	$0.00	$31.53
2	55	$25.17	$8.65	$6.27	$0.00	$40.09
3	60	$27.46	$8.65	$6.84	$0.00	$42.95
4	65	$29.74	$8.65	$7.41	$0.00	$45.80
5	70	$32.03	$8.65	$19.63	$0.00	$60.31
6	75	$34.32	$8.65	$20.20	$0.00	$63.17
7	80	$36.61	$8.65	$20.77	$0.00	$66.03
8	90	$41.18	$8.65	$21.91	$0.00	$71.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$42.62	$8.65	$23.05	$0.00	$74.32
	07/01/2022	$43.82	$8.65	$23.05	$0.00	$75.52
	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.31	$8.65	$0.00	$0.00	$29.96
2	55	$23.44	$8.65	$6.27	$0.00	$38.36
3	60	$25.57	$8.65	$6.84	$0.00	$41.06
4	65	$27.70	$8.65	$7.41	$0.00	$43.76
5	70	$29.83	$8.65	$19.63	$0.00	$58.11
6	75	$31.97	$8.65	$20.20	$0.00	$60.82
7	80	$34.10	$8.65	$20.77	$0.00	$63.52
8	90	$38.36	$8.65	$21.91	$0.00	$68.92

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$8.65	$0.00	$0.00	$30.56
2	55	$24.10	$8.65	$6.27	$0.00	$39.02
3	60	$26.29	$8.65	$6.84	$0.00	$41.78
4	65	$28.48	$8.65	$7.41	$0.00	$44.54
5	70	$30.67	$8.65	$19.63	$0.00	$58.95
6	75	$32.87	$8.65	$20.20	$0.00	$61.72
7	80	$35.06	$8.65	$20.77	$0.00	$64.48
8	90	$39.44	$8.65	$21.91	$0.00	$70.00

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$41.22	$8.65	$23.05	$0.00	$72.92
	07/01/2022	$42.42	$8.65	$23.05	$0.00	$74.12
	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.61	$8.65	$0.00	$0.00	$29.26
2	55	$22.67	$8.65	$6.27	$0.00	$37.59
3	60	$24.73	$8.65	$6.84	$0.00	$40.22
4	65	$26.79	$8.65	$7.41	$0.00	$42.85
5	70	$28.85	$8.65	$19.63	$0.00	$57.13
6	75	$30.92	$8.65	$20.20	$0.00	$59.77
7	80	$32.98	$8.65	$20.77	$0.00	$62.40
8	90	$37.10	$8.65	$21.91	$0.00	$67.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.21	$8.65	$0.00	$0.00	$29.86
2	55	$23.33	$8.65	$6.27	$0.00	$38.25
3	60	$25.45	$8.65	$6.84	$0.00	$40.94
4	65	$27.57	$8.65	$7.41	$0.00	$43.63
5	70	$29.69	$8.65	$19.63	$0.00	$57.97
6	75	$31.82	$8.65	$20.20	$0.00	$60.67
7	80	$33.94	$8.65	$20.77	$0.00	$63.36
8	90	$38.18	$8.65	$21.91	$0.00	$68.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 2)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63

Apprentice - *PILE DRIVER - Local 56 Zone 2*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: Apprentice wages shall be no less than the following Steps;
(Same as set in Zone 1)
1$57.06/2$61.96/3$66.87/4$69.32/5$71.78/6$71.78/7$76.68/8$76.68

Apprentice to Journeyworker Ratio:1:5

PIPELAYER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

PLUMBER & PIPEFITTER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

Apprentice - *PLUMBER/PIPEFITTER - Local 51*

Effective Date - 08/30/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.60	$10.15	$2.50	$0.00	$31.25
2	50	$23.25	$10.15	$2.50	$0.00	$35.90
3	60	$27.89	$10.15	$8.80	$0.00	$46.84
4	70	$32.54	$10.15	$14.08	$0.00	$56.77
5	80	$37.19	$10.15	$17.60	$0.00	$64.94

Notes:
Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

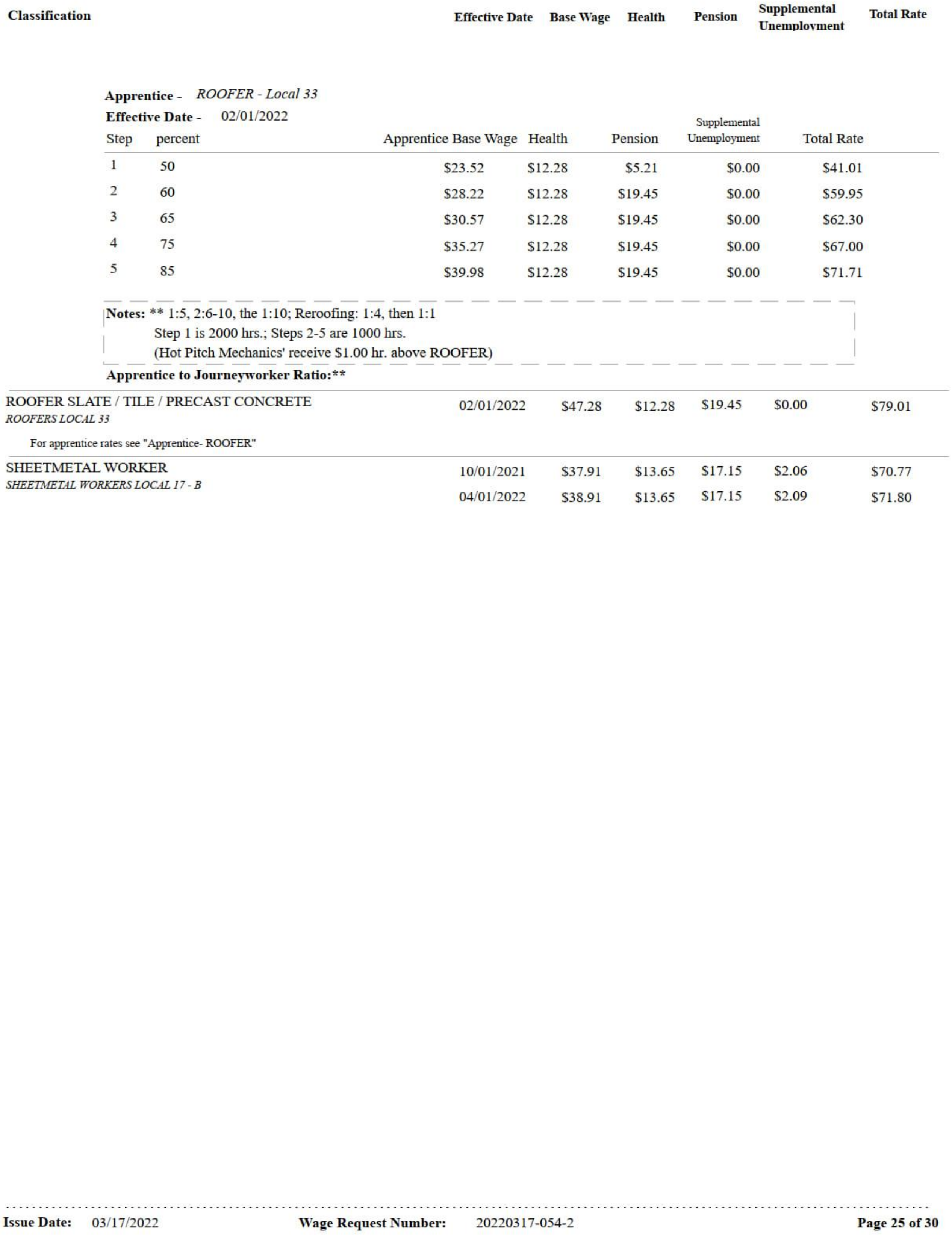
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
	06/01/2022	$37.31	$9.10	$16.64	$0.00	$63.05
	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 653 - Southeastern Concrete (Weymouth)*	08/01/2021	$24.00	$12.91	$6.90	$0.00	$43.81
	05/01/2022	$24.50	$12.91	$6.90	$0.00	$44.31
	08/01/2022	$24.50	$13.41	$6.90	$0.00	$44.81
	05/01/2023	$25.00	$13.41	$6.90	$0.00	$45.31
	08/01/2023	$25.00	$13.91	$6.90	$0.00	$45.81
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2022	$47.03	$12.28	$19.45	$0.00	$78.76



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.52	$12.28	$5.21	$0.00	$41.01
2	60	$28.22	$12.28	$19.45	$0.00	$59.95
3	65	$30.57	$12.28	$19.45	$0.00	$62.30
4	75	$35.27	$12.28	$19.45	$0.00	$67.00
5	85	$39.98	$12.28	$19.45	$0.00	$71.71

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2022	$47.28	$12.28	$19.45	$0.00	$79.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - B*	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80

Apprentice - *SHEET METAL WORKER - Local 17-B*

Effective Date - 10/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$15.16	$13.65	$4.02	$0.98	$33.81
2	45	$17.06	$13.65	$4.52	$1.06	$36.29
3	50	$18.96	$13.65	$11.08	$1.31	$45.00
4	55	$20.85	$13.65	$11.08	$1.37	$46.95
5	60	$22.75	$13.65	$14.12	$1.52	$52.04
6	65	$24.64	$13.65	$14.38	$1.58	$54.25
7	70	$26.54	$13.65	$14.63	$1.64	$56.46
8	75	$28.43	$13.65	$14.88	$1.71	$58.67
9	80	$30.33	$13.65	$15.14	$1.77	$60.89
10	85	$32.22	$13.65	$15.39	$1.84	$63.10

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$15.56	$13.65	$4.02	$1.00	$34.23
2	45	$17.51	$13.65	$4.52	$1.07	$36.75
3	50	$19.46	$13.65	$11.08	$1.33	$45.52
4	55	$21.40	$13.65	$11.08	$1.38	$47.51
5	60	$23.35	$13.65	$14.12	$1.53	$52.65
6	65	$25.29	$13.65	$14.38	$1.60	$54.92
7	70	$27.24	$13.65	$14.63	$1.67	$57.19
8	75	$29.18	$13.65	$14.88	$1.73	$59.44
9	80	$31.13	$13.65	$15.14	$1.80	$61.72
10	85	$33.07	$13.65	$15.39	$1.86	$63.97

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section B) Zone 2*	03/01/2022	$57.92	$10.44	$22.10	$0.00	$90.46
	10/01/2022	$59.45	$10.44	$22.10	$0.00	$91.99
	03/01/2023	$60.98	$10.44	$22.10	$0.00	$93.52
	10/01/2023	$62.56	$10.44	$22.10	$0.00	$95.10
	03/01/2024	$64.18	$10.44	$22.10	$0.00	$96.72
	10/01/2024	$65.80	$10.44	$22.10	$0.00	$98.34
	03/01/2025	$67.42	$10.44	$22.10	$0.00	$99.96

Apprentice - *SPRINKLER FITTER - Local 550 (Section B) Zone 2*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$20.27	$10.44	$12.35	$0.00	$43.06
2	40	$23.17	$10.44	$13.10	$0.00	$46.71
3	45	$26.06	$10.44	$13.85	$0.00	$50.35
4	50	$28.96	$10.44	$14.60	$0.00	$54.00
5	55	$31.86	$10.44	$15.35	$0.00	$57.65
6	60	$34.75	$10.44	$16.10	$0.00	$61.29
7	65	$37.65	$10.44	$16.85	$0.00	$64.94
8	70	$40.54	$10.44	$17.60	$0.00	$68.58
9	75	$43.44	$10.44	$18.35	$0.00	$72.23
10	80	$46.34	$10.44	$19.10	$0.00	$75.88

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$20.81	$10.44	$12.35	$0.00	$43.60
2	40	$23.78	$10.44	$13.10	$0.00	$47.32
3	45	$26.75	$10.44	$13.85	$0.00	$51.04
4	50	$29.73	$10.44	$14.60	$0.00	$54.77
5	55	$32.70	$10.44	$15.35	$0.00	$58.49
6	60	$35.67	$10.44	$16.10	$0.00	$62.21
7	65	$38.64	$10.44	$16.85	$0.00	$65.93
8	70	$41.62	$10.44	$17.60	$0.00	$69.66
9	75	$44.59	$10.44	$18.35	$0.00	$73.38
10	80	$47.56	$10.44	$19.10	$0.00	$77.10

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 223*
Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$56.09	$11.39	$22.34	$0.00	$89.82

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*
Effective Date - 02/01/2022

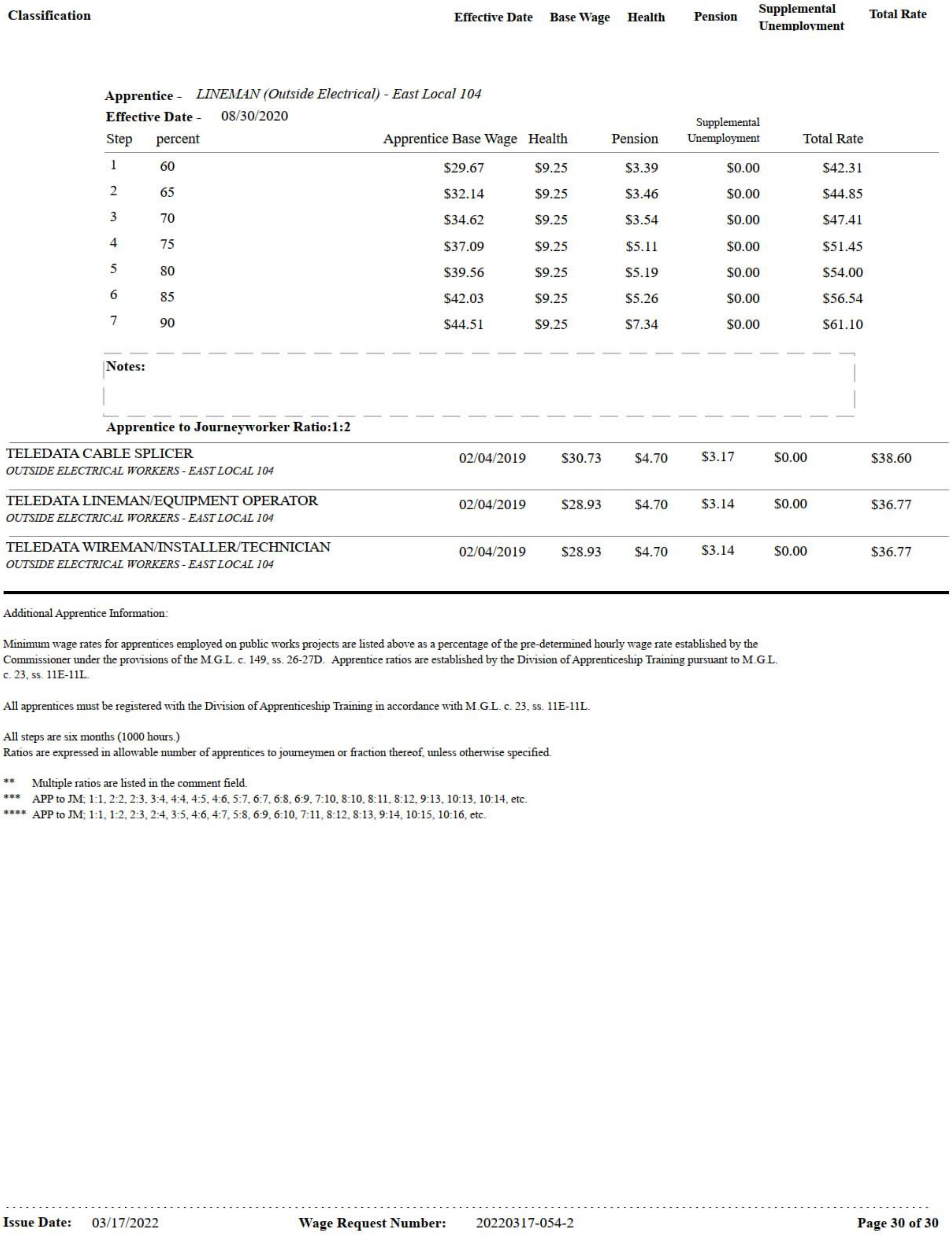
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.34	$0.00	$61.78
2	60	$33.65	$11.39	$22.34	$0.00	$67.38
3	70	$39.26	$11.39	$22.34	$0.00	$72.99
4	80	$44.87	$11.39	$22.34	$0.00	$78.60
5	90	$50.48	$11.39	$22.34	$0.00	$84.21

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.58	$9.10	$17.72	$0.00	$69.40
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.30	$9.10	$17.72	$0.00	$68.12
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$53.41	$9.10	$18.17	$0.00	$80.68
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$55.41	$9.10	$18.17	$0.00	$82.68
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$45.48	$9.10	$18.17	$0.00	$72.75

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2021	$47.48	$9.10	$18.17	$0.00	$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*
Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

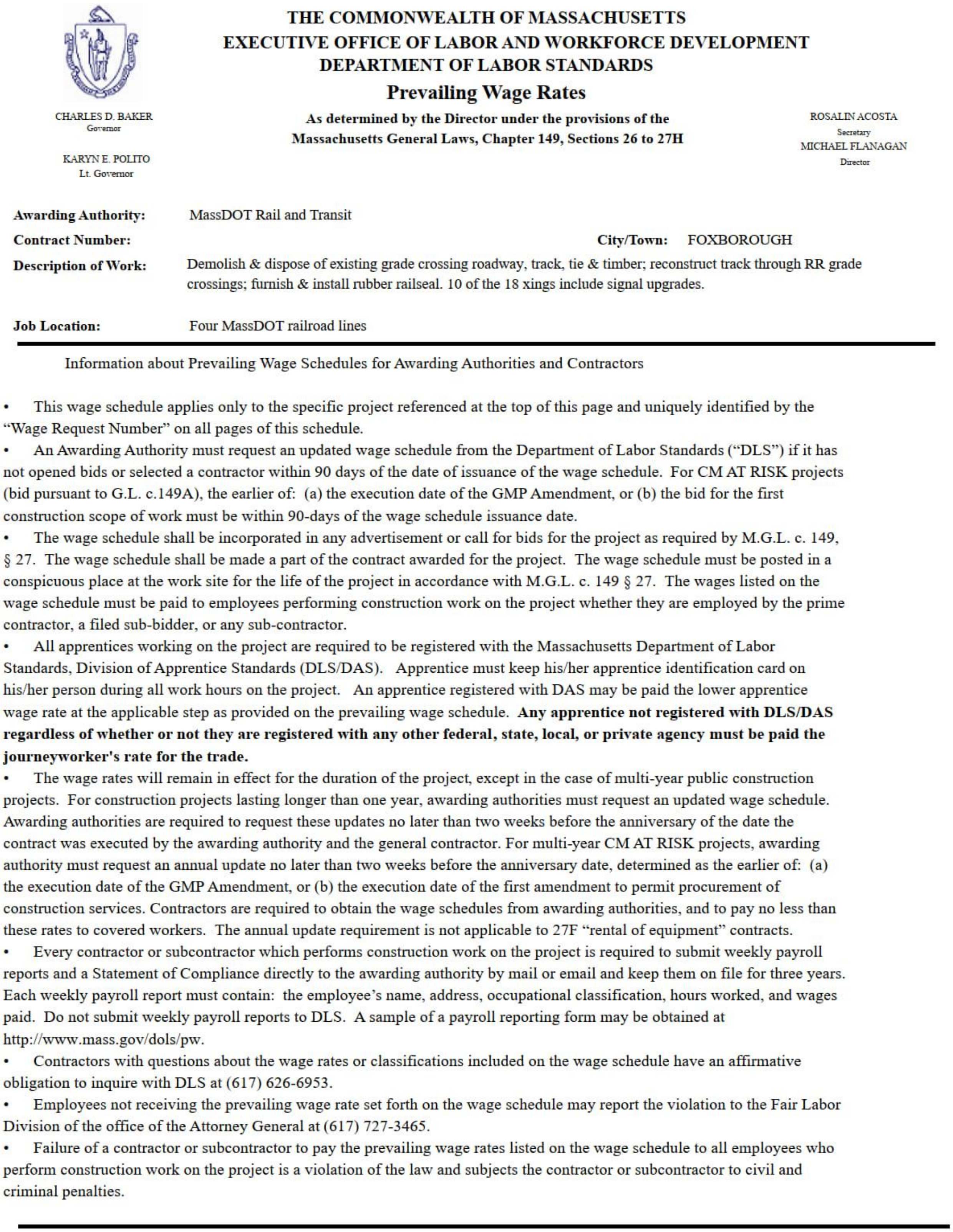
Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Rail and Transit

Contract Number: **City/Town:** FOXBOROUGH

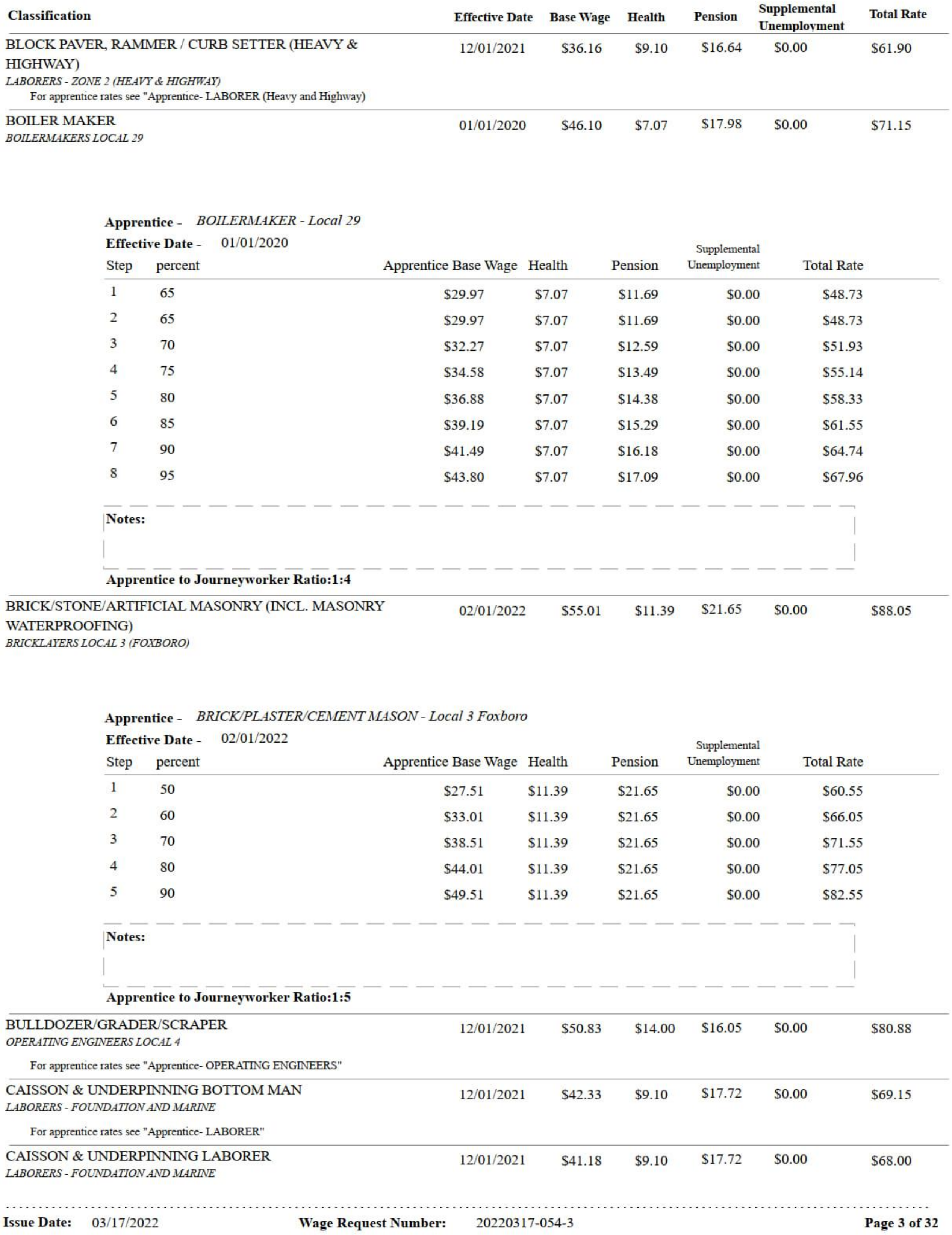
Description of Work: Demolish & dispose of existing grade crossing roadway, track, tie & timber; reconstruct track through RR grade crossings; furnish & install rubber railseal. 10 of the 18 xings include signal upgrades.

Job Location: Four MassDOT railroad lines

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (FOXBORO)*	02/01/2022	$55.01	$11.39	$21.65	$0.00	$88.05

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Foxboro*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.51	$11.39	$21.65	$0.00	$60.55
2	60	$33.01	$11.39	$21.65	$0.00	$66.05
3	70	$38.51	$11.39	$21.65	$0.00	$71.55
4	80	$44.01	$11.39	$21.65	$0.00	$77.05
5	90	$49.51	$11.39	$21.65	$0.00	$82.55

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.33	$9.10	$17.72	$0.00	$69.15
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2022	$44.53	$8.68	$19.97	$0.00	$73.18
	09/01/2022	$45.18	$8.68	$19.97	$0.00	$73.83
	03/01/2023	$45.78	$8.68	$19.97	$0.00	$74.43

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.27	$8.68	$1.73	$0.00	$32.68
2	60	$26.72	$8.68	$1.73	$0.00	$37.13
3	70	$31.17	$8.68	$14.78	$0.00	$54.63
4	75	$33.40	$8.68	$14.78	$0.00	$56.86
5	80	$35.62	$8.68	$16.51	$0.00	$60.81
6	80	$35.62	$8.68	$16.51	$0.00	$60.81
7	90	$40.08	$8.68	$18.24	$0.00	$67.00
8	90	$40.08	$8.68	$18.24	$0.00	$67.00

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.59	$8.68	$1.73	$0.00	$33.00
2	60	$27.11	$8.68	$1.73	$0.00	$37.52
3	70	$31.63	$8.68	$14.78	$0.00	$55.09
4	75	$33.89	$8.68	$14.78	$0.00	$57.35
5	80	$36.14	$8.68	$16.51	$0.00	$61.33
6	80	$36.14	$8.68	$16.51	$0.00	$61.33
7	90	$40.66	$8.68	$18.24	$0.00	$67.58
8	90	$40.66	$8.68	$18.24	$0.00	$67.58

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $30.45/ 3&4 $36.57/ 5&6 $56.36/ 7&8 $62.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17

All Aspects of New Wood Frame Work

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (FOXBORO)*	01/01/2020	$44.67	$12.75	$22.41	$0.62	$80.45

Apprentice - *CEMENT MASONRY/PLASTERING - Foxboro*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.34	$12.75	$15.41	$0.00	$50.50
2	60	$26.80	$12.75	$17.41	$0.62	$57.58
3	65	$29.04	$12.75	$18.41	$0.62	$60.82
4	70	$31.27	$12.75	$19.41	$0.62	$64.05
5	75	$33.50	$12.75	$20.41	$0.62	$67.28
6	80	$35.74	$12.75	$21.41	$0.62	$70.52
7	90	$40.20	$12.75	$22.41	$0.62	$75.98

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$52.38	$14.00	$16.05	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 103*	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.93	$13.00	$0.69	$0.00	$36.62
2	40	$22.93	$13.00	$0.69	$0.00	$36.62
3	45	$25.79	$13.00	$15.62	$0.00	$54.41
4	45	$25.79	$13.00	$15.62	$0.00	$54.41
5	50	$28.66	$13.00	$16.10	$0.00	$57.76
6	55	$31.53	$13.00	$16.58	$0.00	$61.11
7	60	$34.39	$13.00	$17.04	$0.00	$64.43
8	65	$37.26	$13.00	$17.52	$0.00	$67.78
9	70	$40.12	$13.00	$17.98	$0.00	$71.10
10	75	$42.99	$13.00	$18.46	$0.00	$74.45

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$23.50	$13.00	$0.71	$0.00	$37.21
2	40	$23.50	$13.00	$0.71	$0.00	$37.21
3	45	$26.44	$13.00	$15.64	$0.00	$55.08
4	45	$26.44	$13.00	$15.64	$0.00	$55.08
5	50	$29.38	$13.00	$16.12	$0.00	$58.50
6	55	$32.32	$13.00	$16.60	$0.00	$61.92
7	60	$35.26	$13.00	$17.07	$0.00	$65.33
8	65	$38.19	$13.00	$17.55	$0.00	$68.74
9	70	$41.13	$13.00	$18.01	$0.00	$72.14
10	75	$44.07	$13.00	$18.49	$0.00	$75.56

Notes: :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*
Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4* For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$46.53	$13.75	$15.80	$0.00	$76.08
	05/01/2022	$47.86	$13.75	$15.80	$0.00	$77.41
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$48.06	$13.75	$15.80	$0.00	$77.61
	05/01/2022	$49.22	$13.75	$15.80	$0.00	$78.77
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$23.16	$13.75	$15.80	$0.00	$52.71
	05/01/2022	$23.83	$13.75	$15.80	$0.00	$53.38
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103* For apprentice rates see "Apprentice- ELECTRICIAN"	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 103* For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"	03/01/2022	$44.71	$13.00	$18.74	$0.00	$76.45
	09/01/2022	$46.42	$13.00	$18.87	$0.00	$78.29
	03/01/2023	$48.34	$13.00	$19.01	$0.00	$80.35
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$41.76	$14.00	$16.05	$0.00	$71.81
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$24.50	$9.10	$16.64	$0.00	$50.24
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2022	$49.93	$8.68	$20.27	$0.00	$78.88

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.97	$8.68	$1.79	$0.00	$35.44
2	55	$27.46	$8.68	$1.79	$0.00	$37.93
3	60	$29.96	$8.68	$14.90	$0.00	$53.54
4	65	$32.45	$8.68	$14.90	$0.00	$56.03
5	70	$34.95	$8.68	$16.69	$0.00	$60.32
6	75	$37.45	$8.68	$16.69	$0.00	$62.82
7	80	$39.94	$8.68	$18.48	$0.00	$67.10
8	85	$42.44	$8.68	$18.48	$0.00	$69.60

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $32.94/ 3&4 $39.66/ 5&6 $60.32/ 7&8 $67.10

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43

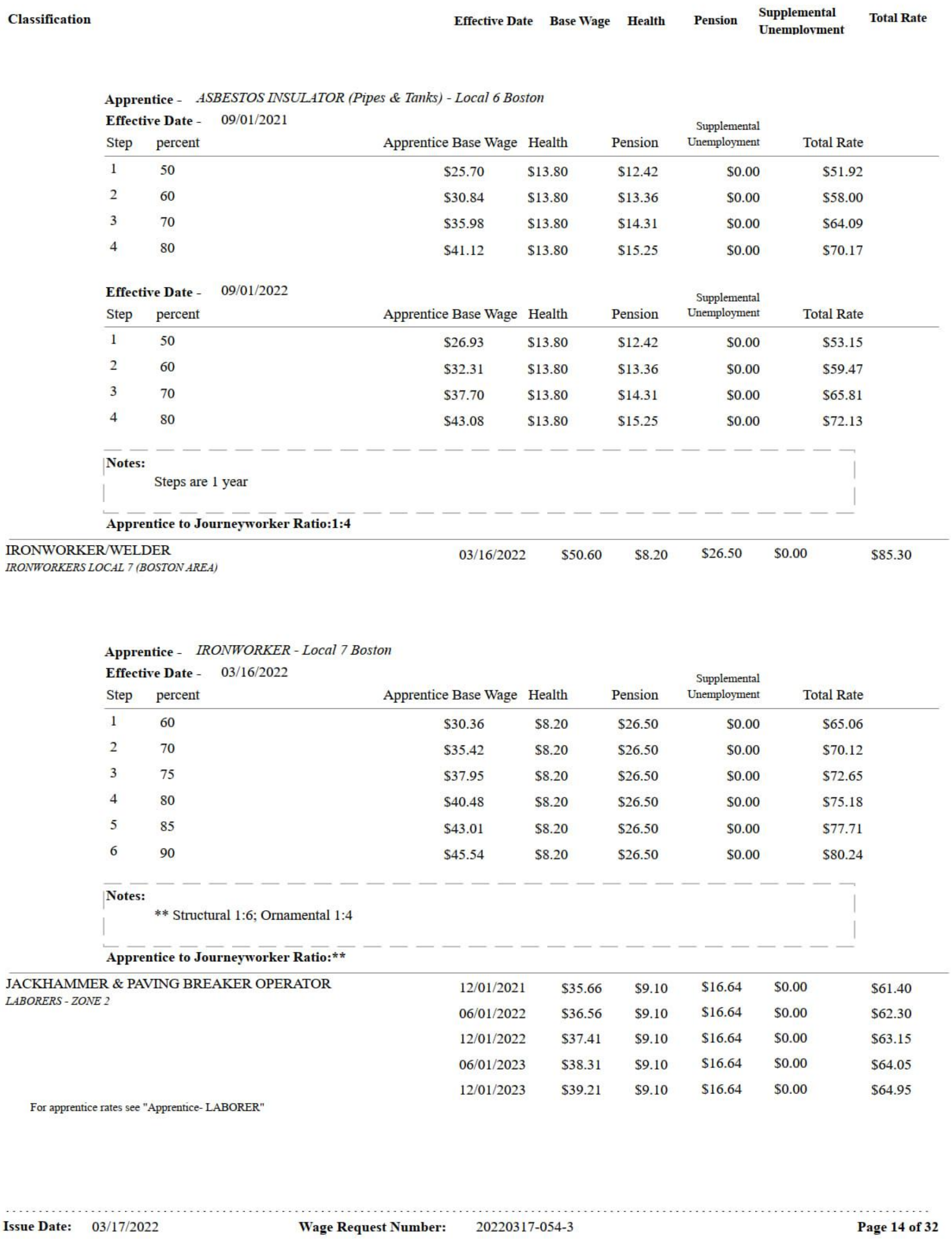
Apprentice - *OPERATING ENGINEERS - Local 4*
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.26	$14.00	$0.00	$0.00	$42.26
2	60	$30.83	$14.00	$16.05	$0.00	$60.88
3	65	$33.40	$14.00	$16.05	$0.00	$63.45
4	70	$35.97	$14.00	$16.05	$0.00	$66.02
5	75	$38.54	$14.00	$16.05	$0.00	$68.59
6	80	$41.10	$14.00	$16.05	$0.00	$71.15
7	85	$43.67	$14.00	$16.05	$0.00	$73.72
8	90	$46.24	$14.00	$16.05	$0.00	$76.29

Notes:

Apprentice to Journeyworker Ratio:1:6

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A* For apprentice rates see "Apprentice- SHEET METAL WORKER"	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A* For apprentice rates see "Apprentice- SHEET METAL WORKER"	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537* For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88
HVAC MECHANIC *PIPEFITTERS LOCAL 537* For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2021	$51.40	$13.80	$17.14	$0.00	$82.34
	09/01/2022	$53.85	$13.80	$17.14	$0.00	$84.79



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.70	$13.80	$12.42	$0.00	$51.92
2	60	$30.84	$13.80	$13.36	$0.00	$58.00
3	70	$35.98	$13.80	$14.31	$0.00	$64.09
4	80	$41.12	$13.80	$15.25	$0.00	$70.17

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.93	$13.80	$12.42	$0.00	$53.15
2	60	$32.31	$13.80	$13.36	$0.00	$59.47
3	70	$37.70	$13.80	$14.31	$0.00	$65.81
4	80	$43.08	$13.80	$15.25	$0.00	$72.13

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	03/16/2022	$50.60	$8.20	$26.50	$0.00	$85.30

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 03/16/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$30.36	$8.20	$26.50	$0.00	$65.06
2	70	$35.42	$8.20	$26.50	$0.00	$70.12
3	75	$37.95	$8.20	$26.50	$0.00	$72.65
4	80	$40.48	$8.20	$26.50	$0.00	$75.18
5	85	$43.01	$8.20	$26.50	$0.00	$77.71
6	90	$45.54	$8.20	$26.50	$0.00	$80.24

Notes:

** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Effective Date - 06/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.79	$9.10	$16.64	$0.00	$47.53
2	70	$25.42	$9.10	$16.64	$0.00	$51.16
3	80	$29.05	$9.10	$16.64	$0.00	$54.79
4	90	$32.68	$9.10	$16.64	$0.00	$58.42

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.50	$9.10	$16.70	$0.00	$61.30
	06/01/2022	$36.40	$9.10	$16.70	$0.00	$62.20
	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$43.69	$11.39	$20.37	$0.00	$75.45

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.37	$0.00	$53.61
2	60	$26.21	$11.39	$20.37	$0.00	$57.97
3	70	$30.58	$11.39	$20.37	$0.00	$62.34
4	80	$34.95	$11.39	$20.37	$0.00	$66.71
5	90	$39.32	$11.39	$20.37	$0.00	$71.08

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$57.17	$11.39	$22.31	$0.00	$90.87

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.31	$0.00	$62.29
2	60	$34.30	$11.39	$22.31	$0.00	$68.00
3	70	$40.02	$11.39	$22.31	$0.00	$73.72
4	80	$45.74	$11.39	$22.31	$0.00	$79.44
5	90	$51.45	$11.39	$22.31	$0.00	$85.15

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/03/2022	$40.67	$8.58	$21.57	$0.00	$70.82
	01/02/2023	$41.92	$8.58	$21.57	$0.00	$72.07

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.37	$8.58	$5.72	$0.00	$36.67
2	65	$26.44	$8.58	$17.93	$0.00	$52.95
3	75	$30.50	$8.58	$18.98	$0.00	$58.06
4	85	$34.57	$8.58	$20.01	$0.00	$63.16

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.06	$8.58	$5.72	$0.00	$37.36
2	65	$27.25	$8.58	$17.93	$0.00	$53.76
3	75	$31.44	$8.58	$18.98	$0.00	$59.00
4	85	$35.63	$8.58	$20.01	$0.00	$64.22

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$23.48	$14.00	$16.05	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$28.44	$14.00	$16.05	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$44.56	$8.65	$23.05	$0.00	$76.26
	07/01/2022	$45.76	$8.65	$23.05	$0.00	$77.46
	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.28	$8.65	$0.00	$0.00	$30.93
2	55	$24.51	$8.65	$6.27	$0.00	$39.43
3	60	$26.74	$8.65	$6.84	$0.00	$42.23
4	65	$28.96	$8.65	$7.41	$0.00	$45.02
5	70	$31.19	$8.65	$19.63	$0.00	$59.47
6	75	$33.42	$8.65	$20.20	$0.00	$62.27
7	80	$35.65	$8.65	$20.77	$0.00	$65.07
8	90	$40.10	$8.65	$21.91	$0.00	$70.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$8.65	$0.00	$0.00	$31.53
2	55	$25.17	$8.65	$6.27	$0.00	$40.09
3	60	$27.46	$8.65	$6.84	$0.00	$42.95
4	65	$29.74	$8.65	$7.41	$0.00	$45.80
5	70	$32.03	$8.65	$19.63	$0.00	$60.31
6	75	$34.32	$8.65	$20.20	$0.00	$63.17
7	80	$36.61	$8.65	$20.77	$0.00	$66.03
8	90	$41.18	$8.65	$21.91	$0.00	$71.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$42.62	$8.65	$23.05	$0.00	$74.32
	07/01/2022	$43.82	$8.65	$23.05	$0.00	$75.52
	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.31	$8.65	$0.00	$0.00	$29.96
2	55	$23.44	$8.65	$6.27	$0.00	$38.36
3	60	$25.57	$8.65	$6.84	$0.00	$41.06
4	65	$27.70	$8.65	$7.41	$0.00	$43.76
5	70	$29.83	$8.65	$19.63	$0.00	$58.11
6	75	$31.97	$8.65	$20.20	$0.00	$60.82
7	80	$34.10	$8.65	$20.77	$0.00	$63.52
8	90	$38.36	$8.65	$21.91	$0.00	$68.92

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$8.65	$0.00	$0.00	$30.56
2	55	$24.10	$8.65	$6.27	$0.00	$39.02
3	60	$26.29	$8.65	$6.84	$0.00	$41.78
4	65	$28.48	$8.65	$7.41	$0.00	$44.54
5	70	$30.67	$8.65	$19.63	$0.00	$58.95
6	75	$32.87	$8.65	$20.20	$0.00	$61.72
7	80	$35.06	$8.65	$20.77	$0.00	$64.48
8	90	$39.44	$8.65	$21.91	$0.00	$70.00

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$41.22	$8.65	$23.05	$0.00	$72.92
	07/01/2022	$42.42	$8.65	$23.05	$0.00	$74.12
	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.61	$8.65	$0.00	$0.00	$29.26
2	55	$22.67	$8.65	$6.27	$0.00	$37.59
3	60	$24.73	$8.65	$6.84	$0.00	$40.22
4	65	$26.79	$8.65	$7.41	$0.00	$42.85
5	70	$28.85	$8.65	$19.63	$0.00	$57.13
6	75	$30.92	$8.65	$20.20	$0.00	$59.77
7	80	$32.98	$8.65	$20.77	$0.00	$62.40
8	90	$37.10	$8.65	$21.91	$0.00	$67.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.21	$8.65	$0.00	$0.00	$29.86
2	55	$23.33	$8.65	$6.27	$0.00	$38.25
3	60	$25.45	$8.65	$6.84	$0.00	$40.94
4	65	$27.57	$8.65	$7.41	$0.00	$43.63
5	70	$29.69	$8.65	$19.63	$0.00	$57.97
6	75	$31.82	$8.65	$20.20	$0.00	$60.67
7	80	$33.94	$8.65	$20.77	$0.00	$63.36
8	90	$38.18	$8.65	$21.91	$0.00	$68.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59

Apprentice - *PILE DRIVER - Local 56 Zone 1*
Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$9.40	$23.12	$0.00	$57.06
2	60	$29.44	$9.40	$23.12	$0.00	$61.96
3	70	$34.35	$9.40	$23.12	$0.00	$66.87
4	75	$36.80	$9.40	$23.12	$0.00	$69.32
5	80	$39.26	$9.40	$23.12	$0.00	$71.78
6	80	$39.26	$9.40	$23.12	$0.00	$71.78
7	90	$44.16	$9.40	$23.12	$0.00	$76.68
8	90	$44.16	$9.40	$23.12	$0.00	$76.68

Notes:
% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $34.01/ 3&4 $41.46/ 5&6 $62.80/ 7&8 $69.25

Apprentice to Journeyworker Ratio:1:5

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88

Apprentice - *PIPEFITTER - Local 537*
Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$23.18	$11.70	$8.25	$0.00	$43.13
2	45	$26.07	$11.70	$20.24	$0.00	$58.01
3	60	$34.76	$11.70	$20.24	$0.00	$66.70
4	70	$40.56	$11.70	$20.24	$0.00	$72.50
5	80	$46.35	$11.70	$20.24	$0.00	$78.29

Notes:
** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	03/01/2022	$61.79	$14.07	$18.36	$0.00	$94.22
	09/04/2022	$63.49	$14.07	$18.36	$0.00	$95.92
	02/26/2023	$65.19	$14.07	$18.36	$0.00	$97.62
	09/03/2023	$66.94	$14.07	$18.36	$0.00	$99.37
	03/03/2024	$68.74	$14.07	$18.36	$0.00	$101.17
	09/01/2024	$70.54	$14.07	$18.36	$0.00	$102.97
	03/02/2025	$72.34	$14.07	$18.36	$0.00	$104.77

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$21.63	$14.07	$6.63	$0.00	$42.33
2	40	$24.72	$14.07	$7.52	$0.00	$46.31
3	55	$33.98	$14.07	$10.24	$0.00	$58.29
4	65	$40.16	$14.07	$12.04	$0.00	$66.27
5	75	$46.34	$14.07	$13.85	$0.00	$74.26

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$22.22	$14.07	$6.63	$0.00	$42.92
2	40	$25.40	$14.07	$7.52	$0.00	$46.99
3	55	$34.92	$14.07	$10.24	$0.00	$59.23
4	65	$41.27	$14.07	$12.04	$0.00	$67.38
5	75	$47.62	$14.07	$13.85	$0.00	$75.54

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$69.00, Step5 with lic$76.87

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
	06/01/2022	$37.31	$9.10	$16.64	$0.00	$63.05
	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70

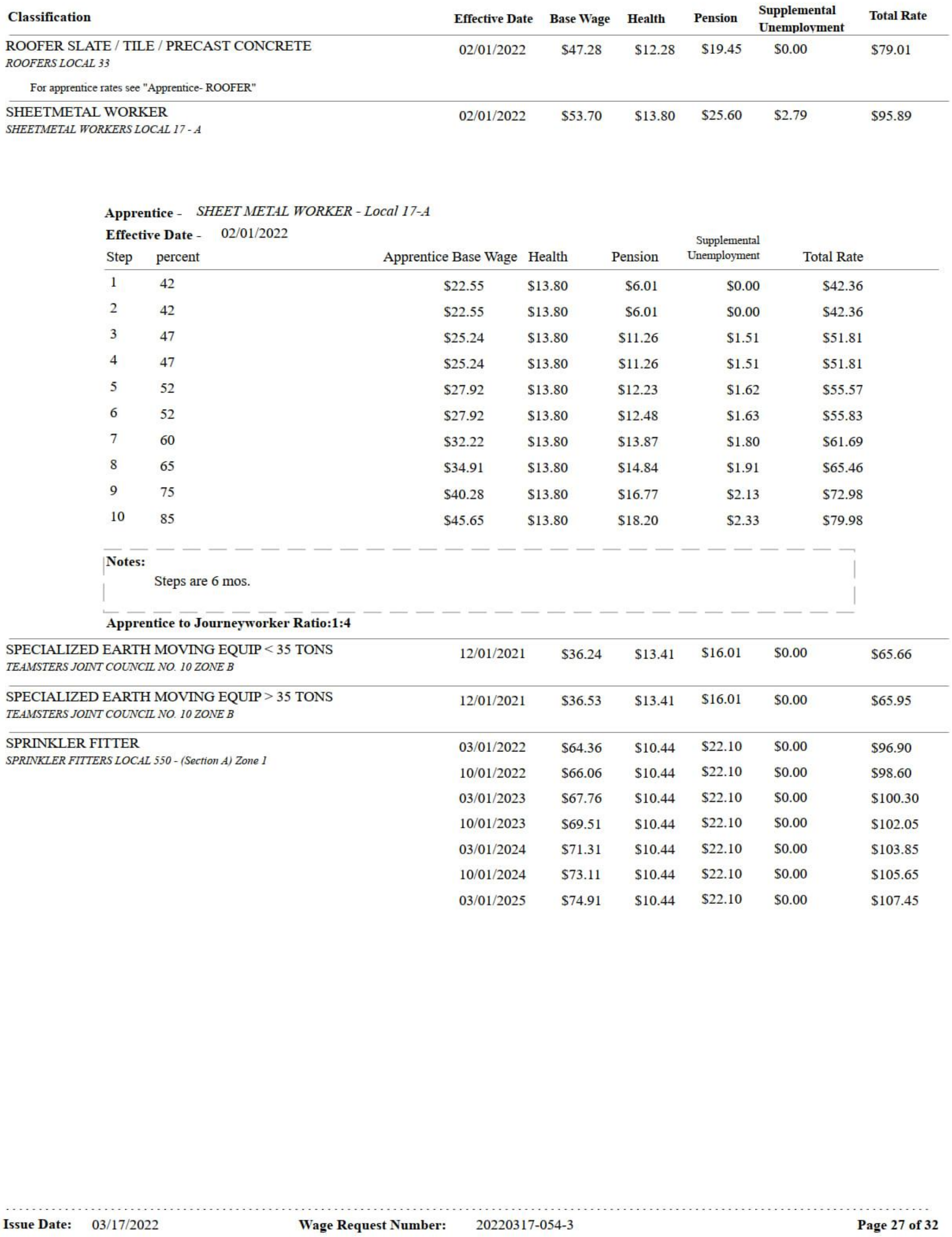
Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2022	$25.75	$9.76	$4.00	$0.00	$39.51
	12/01/2022	$26.40	$10.26	$4.75	$0.00	$41.41
	01/01/2023	$26.40	$10.26	$4.75	$0.00	$41.41
	12/01/2023	$27.00	$10.76	$5.45	$0.00	$43.21
	01/01/2024	$27.00	$10.76	$5.45	$0.00	$43.21
	12/01/2024	$27.60	$11.26	$6.15	$0.00	$45.01
	01/01/2025	$27.60	$11.26	$6.15	$0.00	$45.01
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2022	$47.03	$12.28	$19.45	$0.00	$78.76

Apprentice - *ROOFER - Local 33*
Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.52	$12.28	$5.21	$0.00	$41.01
2	60	$28.22	$12.28	$19.45	$0.00	$59.95
3	65	$30.57	$12.28	$19.45	$0.00	$62.30
4	75	$35.27	$12.28	$19.45	$0.00	$67.00
5	85	$39.98	$12.28	$19.45	$0.00	$71.71

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2022	$47.28	$12.28	$19.45	$0.00	$79.01

For apprentice rates see "Apprentice- ROOFER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 02/01/2022

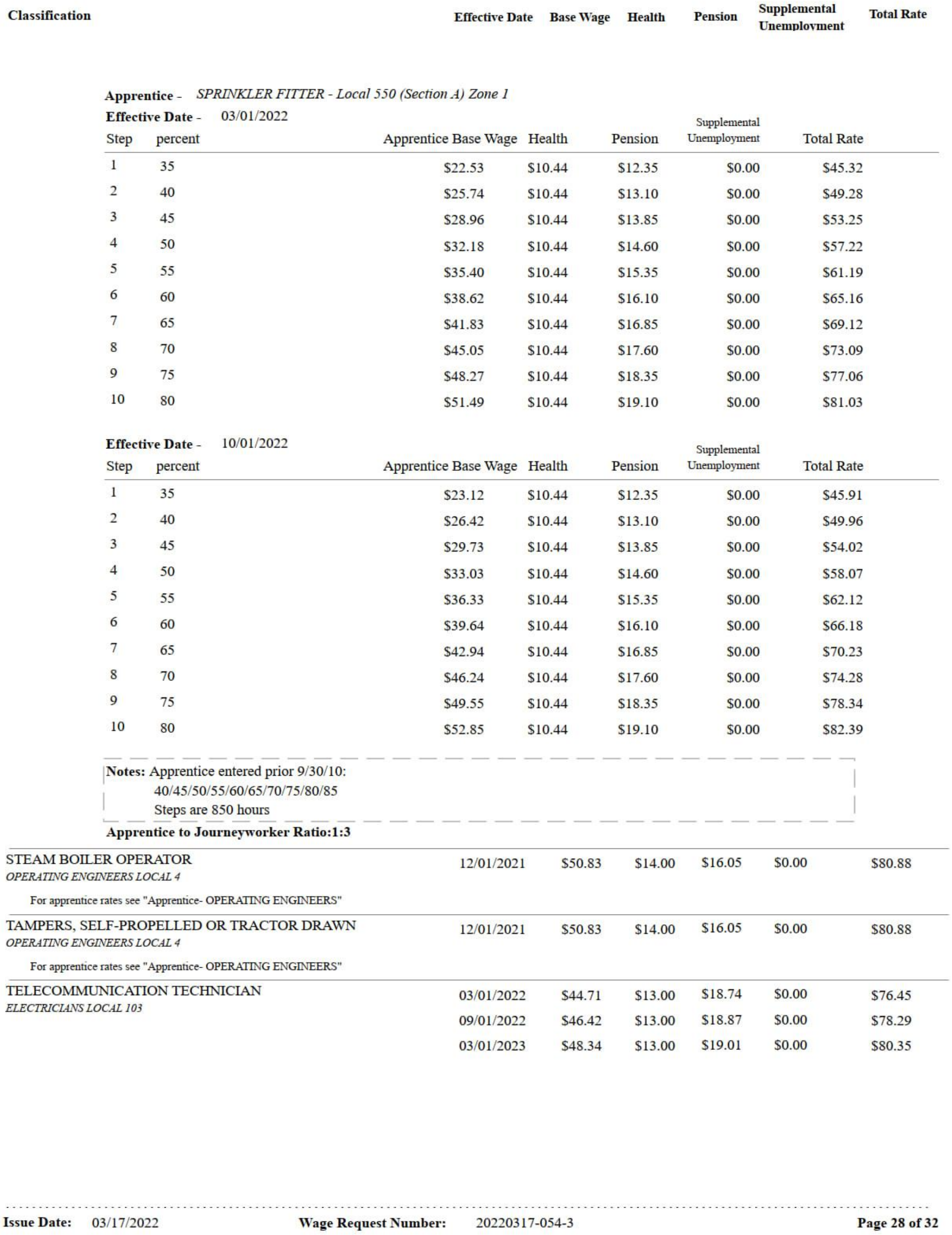
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$22.55	$13.80	$6.01	$0.00	$42.36
2	42	$22.55	$13.80	$6.01	$0.00	$42.36
3	47	$25.24	$13.80	$11.26	$1.51	$51.81
4	47	$25.24	$13.80	$11.26	$1.51	$51.81
5	52	$27.92	$13.80	$12.23	$1.62	$55.57
6	52	$27.92	$13.80	$12.48	$1.63	$55.83
7	60	$32.22	$13.80	$13.87	$1.80	$61.69
8	65	$34.91	$13.80	$14.84	$1.91	$65.46
9	75	$40.28	$13.80	$16.77	$2.13	$72.98
10	85	$45.65	$13.80	$18.20	$2.33	$79.98

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2022	$64.36	$10.44	$22.10	$0.00	$96.90
	10/01/2022	$66.06	$10.44	$22.10	$0.00	$98.60
	03/01/2023	$67.76	$10.44	$22.10	$0.00	$100.30
	10/01/2023	$69.51	$10.44	$22.10	$0.00	$102.05
	03/01/2024	$71.31	$10.44	$22.10	$0.00	$103.85
	10/01/2024	$73.11	$10.44	$22.10	$0.00	$105.65
	03/01/2025	$74.91	$10.44	$22.10	$0.00	$107.45



Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$22.53	$10.44	$12.35	$0.00	$45.32
2	40	$25.74	$10.44	$13.10	$0.00	$49.28
3	45	$28.96	$10.44	$13.85	$0.00	$53.25
4	50	$32.18	$10.44	$14.60	$0.00	$57.22
5	55	$35.40	$10.44	$15.35	$0.00	$61.19
6	60	$38.62	$10.44	$16.10	$0.00	$65.16
7	65	$41.83	$10.44	$16.85	$0.00	$69.12
8	70	$45.05	$10.44	$17.60	$0.00	$73.09
9	75	$48.27	$10.44	$18.35	$0.00	$77.06
10	80	$51.49	$10.44	$19.10	$0.00	$81.03

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$23.12	$10.44	$12.35	$0.00	$45.91
2	40	$26.42	$10.44	$13.10	$0.00	$49.96
3	45	$29.73	$10.44	$13.85	$0.00	$54.02
4	50	$33.03	$10.44	$14.60	$0.00	$58.07
5	55	$36.33	$10.44	$15.35	$0.00	$62.12
6	60	$39.64	$10.44	$16.10	$0.00	$66.18
7	65	$42.94	$10.44	$16.85	$0.00	$70.23
8	70	$46.24	$10.44	$17.60	$0.00	$74.28
9	75	$49.55	$10.44	$18.35	$0.00	$78.34
10	80	$52.85	$10.44	$19.10	$0.00	$82.39

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	03/01/2022	$44.71	$13.00	$18.74	$0.00	$76.45
	09/01/2022	$46.42	$13.00	$18.87	$0.00	$78.29
	03/01/2023	$48.34	$13.00	$19.01	$0.00	$80.35

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$20.12	$13.00	$0.60	$0.00	$33.72
2	45	$20.12	$13.00	$0.60	$0.00	$33.72
3	50	$22.36	$13.00	$15.06	$0.00	$50.42
4	50	$22.36	$13.00	$15.06	$0.00	$50.42
5	55	$24.59	$13.00	$15.43	$0.00	$53.02
6	60	$26.83	$13.00	$15.79	$0.00	$55.62
7	65	$29.06	$13.00	$16.16	$0.00	$58.22
8	70	$31.30	$13.00	$16.53	$0.00	$60.83
9	75	$33.53	$13.00	$16.91	$0.00	$63.44
10	80	$35.77	$13.00	$17.27	$0.00	$66.04

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$20.89	$13.00	$0.63	$0.00	$34.52
2	45	$20.89	$13.00	$0.63	$0.00	$34.52
3	50	$23.21	$13.00	$15.13	$0.00	$51.34
4	50	$23.21	$13.00	$15.13	$0.00	$51.34
5	55	$25.53	$13.00	$15.51	$0.00	$54.04
6	60	$27.85	$13.00	$15.88	$0.00	$56.73
7	65	$30.17	$13.00	$16.26	$0.00	$59.43
8	70	$32.49	$13.00	$16.62	$0.00	$62.11
9	75	$34.82	$13.00	$17.00	$0.00	$64.82
10	80	$37.14	$13.00	$17.37	$0.00	$67.51

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$56.09	$11.39	$22.34	$0.00	$89.82

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*
Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.34	$0.00	$61.78
2	60	$33.65	$11.39	$22.34	$0.00	$67.38
3	70	$39.26	$11.39	$22.34	$0.00	$72.99
4	80	$44.87	$11.39	$22.34	$0.00	$78.60
5	90	$50.48	$11.39	$22.34	$0.00	$84.21

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.58	$9.10	$17.72	$0.00	$69.40
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.30	$9.10	$17.72	$0.00	$68.12
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$53.41	$9.10	$18.17	$0.00	$80.68
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$55.41	$9.10	$18.17	$0.00	$82.68
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$45.48	$9.10	$18.17	$0.00	$72.75
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$47.48	$9.10	$18.17	$0.00	$74.75
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	03/01/2022	$63.39	$13.57	$17.26	$0.00	$94.22
	09/04/2022	$63.49	$14.07	$18.36	$0.00	$95.92
	02/26/2023	$65.19	$14.07	$18.36	$0.00	$97.62
	09/03/2023	$66.94	$14.07	$18.36	$0.00	$99.37
	03/03/2024	$68.74	$14.07	$18.36	$0.00	$101.17
	09/01/2024	$70.54	$14.07	$18.36	$0.00	$102.97
	03/02/2025	$72.34	$14.07	$18.36	$0.00	$104.77
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*
Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Rail and Transit

Contract Number: **City/Town:** MEDFIELD

Description of Work: Demolish & dispose of existing grade crossing roadway, track, tie & timber; reconstruct track through RR grade crossings; furnish & install rubber railseal. 10 of the 18 xings include signal upgrades.

Job Location: Four MassDOT railroad lines

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (LOWELL)*	02/01/2022	$55.01	$11.39	$21.65	$0.00	$88.05

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Lowell*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.51	$11.39	$21.65	$0.00	$60.55
2	60	$33.01	$11.39	$21.65	$0.00	$66.05
3	70	$38.51	$11.39	$21.65	$0.00	$71.55
4	80	$44.01	$11.39	$21.65	$0.00	$77.05
5	90	$49.51	$11.39	$21.65	$0.00	$82.55

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.33	$9.10	$17.72	$0.00	$69.15
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2022	$44.53	$8.68	$19.97	$0.00	$73.18
	09/01/2022	$45.18	$8.68	$19.97	$0.00	$73.83
	03/01/2023	$45.78	$8.68	$19.97	$0.00	$74.43

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.27	$8.68	$1.73	$0.00	$32.68
2	60	$26.72	$8.68	$1.73	$0.00	$37.13
3	70	$31.17	$8.68	$14.78	$0.00	$54.63
4	75	$33.40	$8.68	$14.78	$0.00	$56.86
5	80	$35.62	$8.68	$16.51	$0.00	$60.81
6	80	$35.62	$8.68	$16.51	$0.00	$60.81
7	90	$40.08	$8.68	$18.24	$0.00	$67.00
8	90	$40.08	$8.68	$18.24	$0.00	$67.00

Effective Date - 09/01/2022

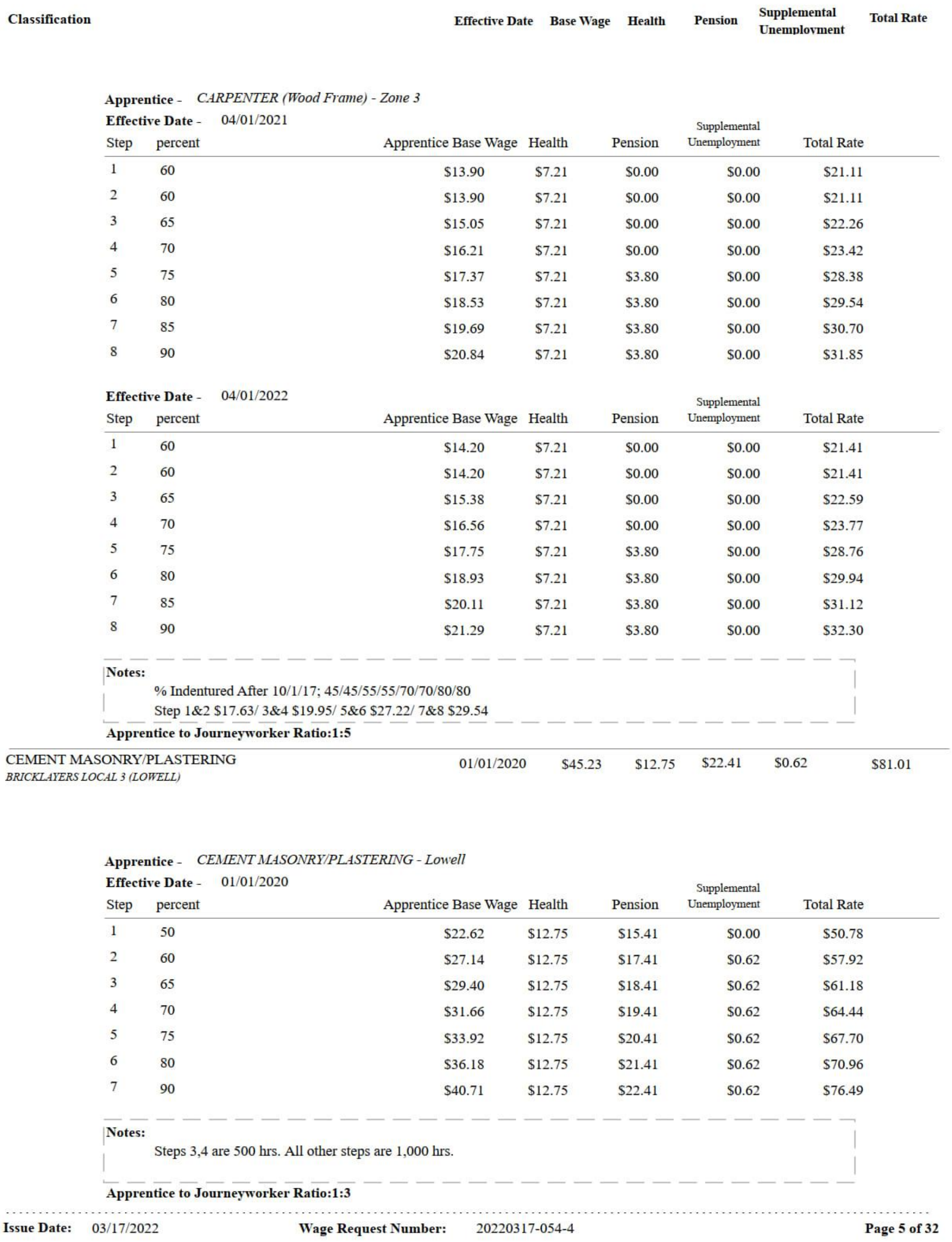
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.59	$8.68	$1.73	$0.00	$33.00
2	60	$27.11	$8.68	$1.73	$0.00	$37.52
3	70	$31.63	$8.68	$14.78	$0.00	$55.09
4	75	$33.89	$8.68	$14.78	$0.00	$57.35
5	80	$36.14	$8.68	$16.51	$0.00	$61.33
6	80	$36.14	$8.68	$16.51	$0.00	$61.33
7	90	$40.66	$8.68	$18.24	$0.00	$67.58
8	90	$40.66	$8.68	$18.24	$0.00	$67.58

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $30.45/ 3&4 $36.57/ 5&6 $56.36/ 7&8 $62.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17
All Aspects of New Wood Frame Work						



Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (LOWELL)*	01/01/2020	$45.23	$12.75	$22.41	$0.62	$81.01

Apprentice - *CEMENT MASONRY/PLASTERING - Lowell*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.62	$12.75	$15.41	$0.00	$50.78
2	60	$27.14	$12.75	$17.41	$0.62	$57.92
3	65	$29.40	$12.75	$18.41	$0.62	$61.18
4	70	$31.66	$12.75	$19.41	$0.62	$64.44
5	75	$33.92	$12.75	$20.41	$0.62	$67.70
6	80	$36.18	$12.75	$21.41	$0.62	$70.96
7	90	$40.71	$12.75	$22.41	$0.62	$76.49

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$52.38	$14.00	$16.05	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

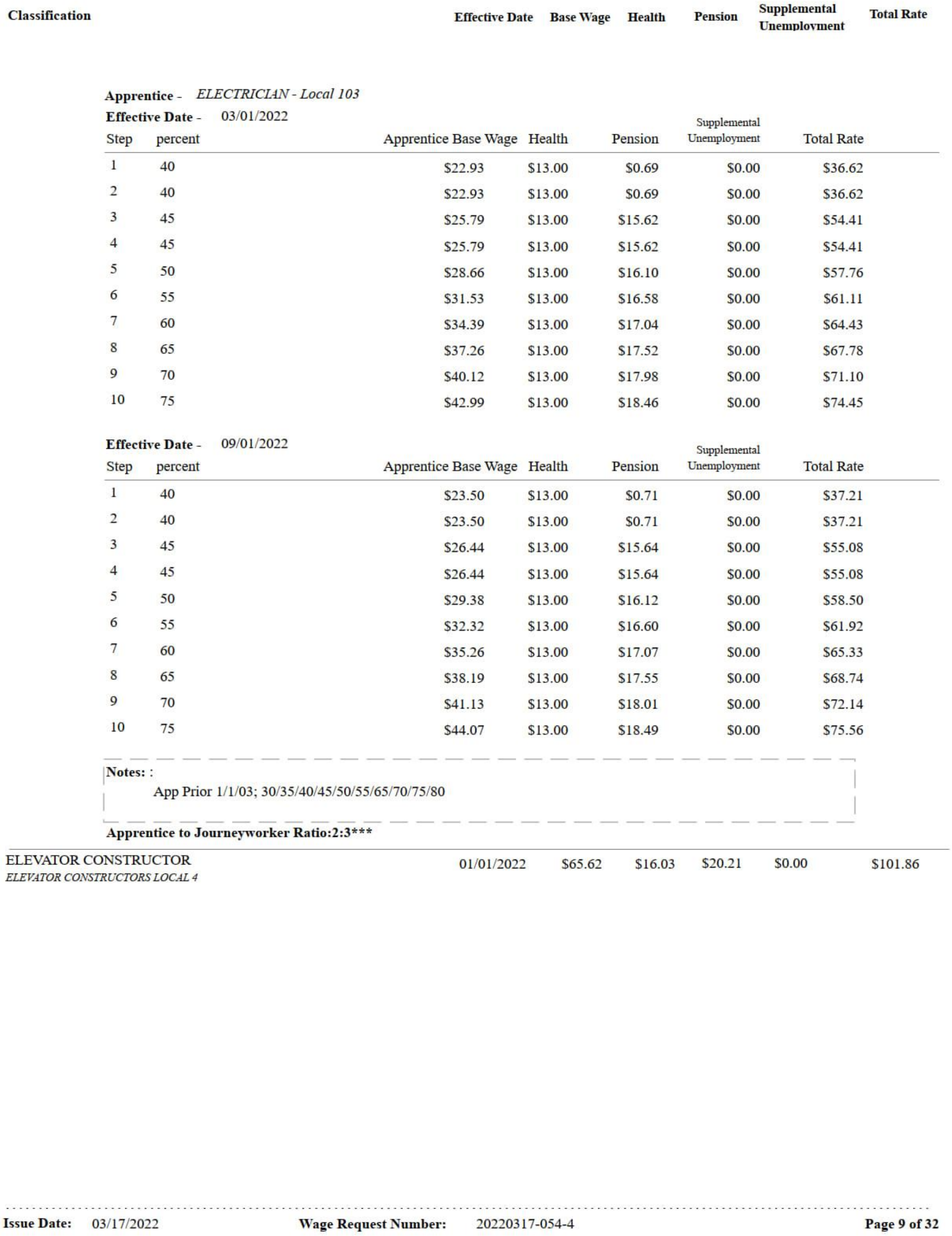
Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 103*	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.93	$13.00	$0.69	$0.00	$36.62
2	40	$22.93	$13.00	$0.69	$0.00	$36.62
3	45	$25.79	$13.00	$15.62	$0.00	$54.41
4	45	$25.79	$13.00	$15.62	$0.00	$54.41
5	50	$28.66	$13.00	$16.10	$0.00	$57.76
6	55	$31.53	$13.00	$16.58	$0.00	$61.11
7	60	$34.39	$13.00	$17.04	$0.00	$64.43
8	65	$37.26	$13.00	$17.52	$0.00	$67.78
9	70	$40.12	$13.00	$17.98	$0.00	$71.10
10	75	$42.99	$13.00	$18.46	$0.00	$74.45

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$23.50	$13.00	$0.71	$0.00	$37.21
2	40	$23.50	$13.00	$0.71	$0.00	$37.21
3	45	$26.44	$13.00	$15.64	$0.00	$55.08
4	45	$26.44	$13.00	$15.64	$0.00	$55.08
5	50	$29.38	$13.00	$16.12	$0.00	$58.50
6	55	$32.32	$13.00	$16.60	$0.00	$61.92
7	60	$35.26	$13.00	$17.07	$0.00	$65.33
8	65	$38.19	$13.00	$17.55	$0.00	$68.74
9	70	$41.13	$13.00	$18.01	$0.00	$72.14
10	75	$44.07	$13.00	$18.49	$0.00	$75.56

Notes: :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4* For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$46.53	$13.75	$15.80	$0.00	$76.08
	05/01/2022	$47.86	$13.75	$15.80	$0.00	$77.41
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$48.06	$13.75	$15.80	$0.00	$77.61
	05/01/2022	$49.22	$13.75	$15.80	$0.00	$78.77
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$23.16	$13.75	$15.80	$0.00	$52.71
	05/01/2022	$23.83	$13.75	$15.80	$0.00	$53.38
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103* For apprentice rates see "Apprentice- ELECTRICIAN"	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 103* For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"	03/01/2022	$44.71	$13.00	$18.74	$0.00	$76.45
	09/01/2022	$46.42	$13.00	$18.87	$0.00	$78.29
	03/01/2023	$48.34	$13.00	$19.01	$0.00	$80.35
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$41.76	$14.00	$16.05	$0.00	$71.81
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$24.50	$9.10	$16.64	$0.00	$50.24
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2022	$49.93	$8.68	$20.27	$0.00	$78.88

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.97	$8.68	$1.79	$0.00	$35.44
2	55	$27.46	$8.68	$1.79	$0.00	$37.93
3	60	$29.96	$8.68	$14.90	$0.00	$53.54
4	65	$32.45	$8.68	$14.90	$0.00	$56.03
5	70	$34.95	$8.68	$16.69	$0.00	$60.32
6	75	$37.45	$8.68	$16.69	$0.00	$62.82
7	80	$39.94	$8.68	$18.48	$0.00	$67.10
8	85	$42.44	$8.68	$18.48	$0.00	$69.60

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $32.94/ 3&4 $39.66/ 5&6 $60.32/ 7&8 $67.10

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43

Apprentice - *OPERATING ENGINEERS - Local 4*
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.26	$14.00	$0.00	$0.00	$42.26
2	60	$30.83	$14.00	$16.05	$0.00	$60.88
3	65	$33.40	$14.00	$16.05	$0.00	$63.45
4	70	$35.97	$14.00	$16.05	$0.00	$66.02
5	75	$38.54	$14.00	$16.05	$0.00	$68.59
6	80	$41.10	$14.00	$16.05	$0.00	$71.15
7	85	$43.67	$14.00	$16.05	$0.00	$73.72
8	90	$46.24	$14.00	$16.05	$0.00	$76.29

Notes:

Apprentice to Journeyworker Ratio:1:6

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2021	$51.40	$13.80	$17.14	$0.00	$82.34
	09/01/2022	$53.85	$13.80	$17.14	$0.00	$84.79

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.70	$13.80	$12.42	$0.00	$51.92
2	60	$30.84	$13.80	$13.36	$0.00	$58.00
3	70	$35.98	$13.80	$14.31	$0.00	$64.09
4	80	$41.12	$13.80	$15.25	$0.00	$70.17

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.93	$13.80	$12.42	$0.00	$53.15
2	60	$32.31	$13.80	$13.36	$0.00	$59.47
3	70	$37.70	$13.80	$14.31	$0.00	$65.81
4	80	$43.08	$13.80	$15.25	$0.00	$72.13

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	03/16/2022	$50.60	$8.20	$26.50	$0.00	$85.30

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 03/16/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$30.36	$8.20	$26.50	$0.00	$65.06
2	70	$35.42	$8.20	$26.50	$0.00	$70.12
3	75	$37.95	$8.20	$26.50	$0.00	$72.65
4	80	$40.48	$8.20	$26.50	$0.00	$75.18
5	85	$43.01	$8.20	$26.50	$0.00	$77.71
6	90	$45.54	$8.20	$26.50	$0.00	$80.24

Notes:

** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Effective Date - 06/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.79	$9.10	$16.64	$0.00	$47.53
2	70	$25.42	$9.10	$16.64	$0.00	$51.16
3	80	$29.05	$9.10	$16.64	$0.00	$54.79
4	90	$32.68	$9.10	$16.64	$0.00	$58.42

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.50	$9.10	$16.70	$0.00	$61.30
	06/01/2022	$36.40	$9.10	$16.70	$0.00	$62.20
	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$43.69	$11.39	$20.37	$0.00	$75.45

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.37	$0.00	$53.61
2	60	$26.21	$11.39	$20.37	$0.00	$57.97
3	70	$30.58	$11.39	$20.37	$0.00	$62.34
4	80	$34.95	$11.39	$20.37	$0.00	$66.71
5	90	$39.32	$11.39	$20.37	$0.00	$71.08

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$57.17	$11.39	$22.31	$0.00	$90.87

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.31	$0.00	$62.29
2	60	$34.30	$11.39	$22.31	$0.00	$68.00
3	70	$40.02	$11.39	$22.31	$0.00	$73.72
4	80	$45.74	$11.39	$22.31	$0.00	$79.44
5	90	$51.45	$11.39	$22.31	$0.00	$85.15

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/03/2022	$40.67	$8.58	$21.57	$0.00	$70.82
	01/02/2023	$41.92	$8.58	$21.57	$0.00	$72.07

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.37	$8.58	$5.72	$0.00	$36.67
2	65	$26.44	$8.58	$17.93	$0.00	$52.95
3	75	$30.50	$8.58	$18.98	$0.00	$58.06
4	85	$34.57	$8.58	$20.01	$0.00	$63.16

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.06	$8.58	$5.72	$0.00	$37.36
2	65	$27.25	$8.58	$17.93	$0.00	$53.76
3	75	$31.44	$8.58	$18.98	$0.00	$59.00
4	85	$35.63	$8.58	$20.01	$0.00	$64.22

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$23.48	$14.00	$16.05	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$28.44	$14.00	$16.05	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$44.56	$8.65	$23.05	$0.00	$76.26
	07/01/2022	$45.76	$8.65	$23.05	$0.00	$77.46
	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.28	$8.65	$0.00	$0.00	$30.93
2	55	$24.51	$8.65	$6.27	$0.00	$39.43
3	60	$26.74	$8.65	$6.84	$0.00	$42.23
4	65	$28.96	$8.65	$7.41	$0.00	$45.02
5	70	$31.19	$8.65	$19.63	$0.00	$59.47
6	75	$33.42	$8.65	$20.20	$0.00	$62.27
7	80	$35.65	$8.65	$20.77	$0.00	$65.07
8	90	$40.10	$8.65	$21.91	$0.00	$70.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$8.65	$0.00	$0.00	$31.53
2	55	$25.17	$8.65	$6.27	$0.00	$40.09
3	60	$27.46	$8.65	$6.84	$0.00	$42.95
4	65	$29.74	$8.65	$7.41	$0.00	$45.80
5	70	$32.03	$8.65	$19.63	$0.00	$60.31
6	75	$34.32	$8.65	$20.20	$0.00	$63.17
7	80	$36.61	$8.65	$20.77	$0.00	$66.03
8	90	$41.18	$8.65	$21.91	$0.00	$71.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$42.62	$8.65	$23.05	$0.00	$74.32
	07/01/2022	$43.82	$8.65	$23.05	$0.00	$75.52
	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.31	$8.65	$0.00	$0.00	$29.96
2	55	$23.44	$8.65	$6.27	$0.00	$38.36
3	60	$25.57	$8.65	$6.84	$0.00	$41.06
4	65	$27.70	$8.65	$7.41	$0.00	$43.76
5	70	$29.83	$8.65	$19.63	$0.00	$58.11
6	75	$31.97	$8.65	$20.20	$0.00	$60.82
7	80	$34.10	$8.65	$20.77	$0.00	$63.52
8	90	$38.36	$8.65	$21.91	$0.00	$68.92

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$8.65	$0.00	$0.00	$30.56
2	55	$24.10	$8.65	$6.27	$0.00	$39.02
3	60	$26.29	$8.65	$6.84	$0.00	$41.78
4	65	$28.48	$8.65	$7.41	$0.00	$44.54
5	70	$30.67	$8.65	$19.63	$0.00	$58.95
6	75	$32.87	$8.65	$20.20	$0.00	$61.72
7	80	$35.06	$8.65	$20.77	$0.00	$64.48
8	90	$39.44	$8.65	$21.91	$0.00	$70.00

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$41.22	$8.65	$23.05	$0.00	$72.92
	07/01/2022	$42.42	$8.65	$23.05	$0.00	$74.12
	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.61	$8.65	$0.00	$0.00	$29.26
2	55	$22.67	$8.65	$6.27	$0.00	$37.59
3	60	$24.73	$8.65	$6.84	$0.00	$40.22
4	65	$26.79	$8.65	$7.41	$0.00	$42.85
5	70	$28.85	$8.65	$19.63	$0.00	$57.13
6	75	$30.92	$8.65	$20.20	$0.00	$59.77
7	80	$32.98	$8.65	$20.77	$0.00	$62.40
8	90	$37.10	$8.65	$21.91	$0.00	$67.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.21	$8.65	$0.00	$0.00	$29.86
2	55	$23.33	$8.65	$6.27	$0.00	$38.25
3	60	$25.45	$8.65	$6.84	$0.00	$40.94
4	65	$27.57	$8.65	$7.41	$0.00	$43.63
5	70	$29.69	$8.65	$19.63	$0.00	$57.97
6	75	$31.82	$8.65	$20.20	$0.00	$60.67
7	80	$33.94	$8.65	$20.77	$0.00	$63.36
8	90	$38.18	$8.65	$21.91	$0.00	$68.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**

Apprentice - *PILE DRIVER - Local 56 Zone 1*
Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$9.40	$23.12	$0.00	$57.06
2	60	$29.44	$9.40	$23.12	$0.00	$61.96
3	70	$34.35	$9.40	$23.12	$0.00	$66.87
4	75	$36.80	$9.40	$23.12	$0.00	$69.32
5	80	$39.26	$9.40	$23.12	$0.00	$71.78
6	80	$39.26	$9.40	$23.12	$0.00	$71.78
7	90	$44.16	$9.40	$23.12	$0.00	$76.68
8	90	$44.16	$9.40	$23.12	$0.00	$76.68

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $34.01/ 3&4 $41.46/ 5&6 $62.80/ 7&8 $69.25

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88

Apprentice - *PIPEFITTER - Local 537*
Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$23.18	$11.70	$8.25	$0.00	$43.13
2	45	$26.07	$11.70	$20.24	$0.00	$58.01
3	60	$34.76	$11.70	$20.24	$0.00	$66.70
4	70	$40.56	$11.70	$20.24	$0.00	$72.50
5	80	$46.35	$11.70	$20.24	$0.00	$78.29

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	03/01/2022	$61.79	$14.07	$18.36	$0.00	$94.22
	09/04/2022	$63.49	$14.07	$18.36	$0.00	$95.92
	02/26/2023	$65.19	$14.07	$18.36	$0.00	$97.62
	09/03/2023	$66.94	$14.07	$18.36	$0.00	$99.37
	03/03/2024	$68.74	$14.07	$18.36	$0.00	$101.17
	09/01/2024	$70.54	$14.07	$18.36	$0.00	$102.97
	03/02/2025	$72.34	$14.07	$18.36	$0.00	$104.77

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$21.63	$14.07	$6.63	$0.00	$42.33
2	40	$24.72	$14.07	$7.52	$0.00	$46.31
3	55	$33.98	$14.07	$10.24	$0.00	$58.29
4	65	$40.16	$14.07	$12.04	$0.00	$66.27
5	75	$46.34	$14.07	$13.85	$0.00	$74.26

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$22.22	$14.07	$6.63	$0.00	$42.92
2	40	$25.40	$14.07	$7.52	$0.00	$46.99
3	55	$34.92	$14.07	$10.24	$0.00	$59.23
4	65	$41.27	$14.07	$12.04	$0.00	$67.38
5	75	$47.62	$14.07	$13.85	$0.00	$75.54

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$69.00, Step5 with lic$76.87

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
	06/01/2022	$37.31	$9.10	$16.64	$0.00	$63.05
	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2022	$25.75	$9.76	$4.00	$0.00	$39.51
	12/01/2022	$26.40	$10.26	$4.75	$0.00	$41.41
	01/01/2023	$26.40	$10.26	$4.75	$0.00	$41.41
	12/01/2023	$27.00	$10.76	$5.45	$0.00	$43.21
	01/01/2024	$27.00	$10.76	$5.45	$0.00	$43.21
	12/01/2024	$27.60	$11.26	$6.15	$0.00	$45.01
	01/01/2025	$27.60	$11.26	$6.15	$0.00	$45.01
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2022	$47.03	$12.28	$19.45	$0.00	$78.76

Apprentice - *ROOFER - Local 33*
Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.52	$12.28	$5.21	$0.00	$41.01
2	60	$28.22	$12.28	$19.45	$0.00	$59.95
3	65	$30.57	$12.28	$19.45	$0.00	$62.30
4	75	$35.27	$12.28	$19.45	$0.00	$67.00
5	85	$39.98	$12.28	$19.45	$0.00	$71.71

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2022	$47.28	$12.28	$19.45	$0.00	$79.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$22.55	$13.80	$6.01	$0.00	$42.36
2	42	$22.55	$13.80	$6.01	$0.00	$42.36
3	47	$25.24	$13.80	$11.26	$1.51	$51.81
4	47	$25.24	$13.80	$11.26	$1.51	$51.81
5	52	$27.92	$13.80	$12.23	$1.62	$55.57
6	52	$27.92	$13.80	$12.48	$1.63	$55.83
7	60	$32.22	$13.80	$13.87	$1.80	$61.69
8	65	$34.91	$13.80	$14.84	$1.91	$65.46
9	75	$40.28	$13.80	$16.77	$2.13	$72.98
10	85	$45.65	$13.80	$18.20	$2.33	$79.98

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2022	$64.36	$10.44	$22.10	$0.00	$96.90
	10/01/2022	$66.06	$10.44	$22.10	$0.00	$98.60
	03/01/2023	$67.76	$10.44	$22.10	$0.00	$100.30
	10/01/2023	$69.51	$10.44	$22.10	$0.00	$102.05
	03/01/2024	$71.31	$10.44	$22.10	$0.00	$103.85
	10/01/2024	$73.11	$10.44	$22.10	$0.00	$105.65
	03/01/2025	$74.91	$10.44	$22.10	$0.00	$107.45

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$22.53	$10.44	$12.35	$0.00	$45.32
2	40	$25.74	$10.44	$13.10	$0.00	$49.28
3	45	$28.96	$10.44	$13.85	$0.00	$53.25
4	50	$32.18	$10.44	$14.60	$0.00	$57.22
5	55	$35.40	$10.44	$15.35	$0.00	$61.19
6	60	$38.62	$10.44	$16.10	$0.00	$65.16
7	65	$41.83	$10.44	$16.85	$0.00	$69.12
8	70	$45.05	$10.44	$17.60	$0.00	$73.09
9	75	$48.27	$10.44	$18.35	$0.00	$77.06
10	80	$51.49	$10.44	$19.10	$0.00	$81.03

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$23.12	$10.44	$12.35	$0.00	$45.91
2	40	$26.42	$10.44	$13.10	$0.00	$49.96
3	45	$29.73	$10.44	$13.85	$0.00	$54.02
4	50	$33.03	$10.44	$14.60	$0.00	$58.07
5	55	$36.33	$10.44	$15.35	$0.00	$62.12
6	60	$39.64	$10.44	$16.10	$0.00	$66.18
7	65	$42.94	$10.44	$16.85	$0.00	$70.23
8	70	$46.24	$10.44	$17.60	$0.00	$74.28
9	75	$49.55	$10.44	$18.35	$0.00	$78.34
10	80	$52.85	$10.44	$19.10	$0.00	$82.39

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	03/01/2022	$44.71	$13.00	$18.74	$0.00	$76.45
	09/01/2022	$46.42	$13.00	$18.87	$0.00	$78.29
	03/01/2023	$48.34	$13.00	$19.01	$0.00	$80.35

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$20.12	$13.00	$0.60	$0.00	$33.72
2	45	$20.12	$13.00	$0.60	$0.00	$33.72
3	50	$22.36	$13.00	$15.06	$0.00	$50.42
4	50	$22.36	$13.00	$15.06	$0.00	$50.42
5	55	$24.59	$13.00	$15.43	$0.00	$53.02
6	60	$26.83	$13.00	$15.79	$0.00	$55.62
7	65	$29.06	$13.00	$16.16	$0.00	$58.22
8	70	$31.30	$13.00	$16.53	$0.00	$60.83
9	75	$33.53	$13.00	$16.91	$0.00	$63.44
10	80	$35.77	$13.00	$17.27	$0.00	$66.04

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$20.89	$13.00	$0.63	$0.00	$34.52
2	45	$20.89	$13.00	$0.63	$0.00	$34.52
3	50	$23.21	$13.00	$15.13	$0.00	$51.34
4	50	$23.21	$13.00	$15.13	$0.00	$51.34
5	55	$25.53	$13.00	$15.51	$0.00	$54.04
6	60	$27.85	$13.00	$15.88	$0.00	$56.73
7	65	$30.17	$13.00	$16.26	$0.00	$59.43
8	70	$32.49	$13.00	$16.62	$0.00	$62.11
9	75	$34.82	$13.00	$17.00	$0.00	$64.82
10	80	$37.14	$13.00	$17.37	$0.00	$67.51

Notes:

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$56.09	$11.39	$22.34	$0.00	$89.82

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*
Effective Date - 02/01/2022

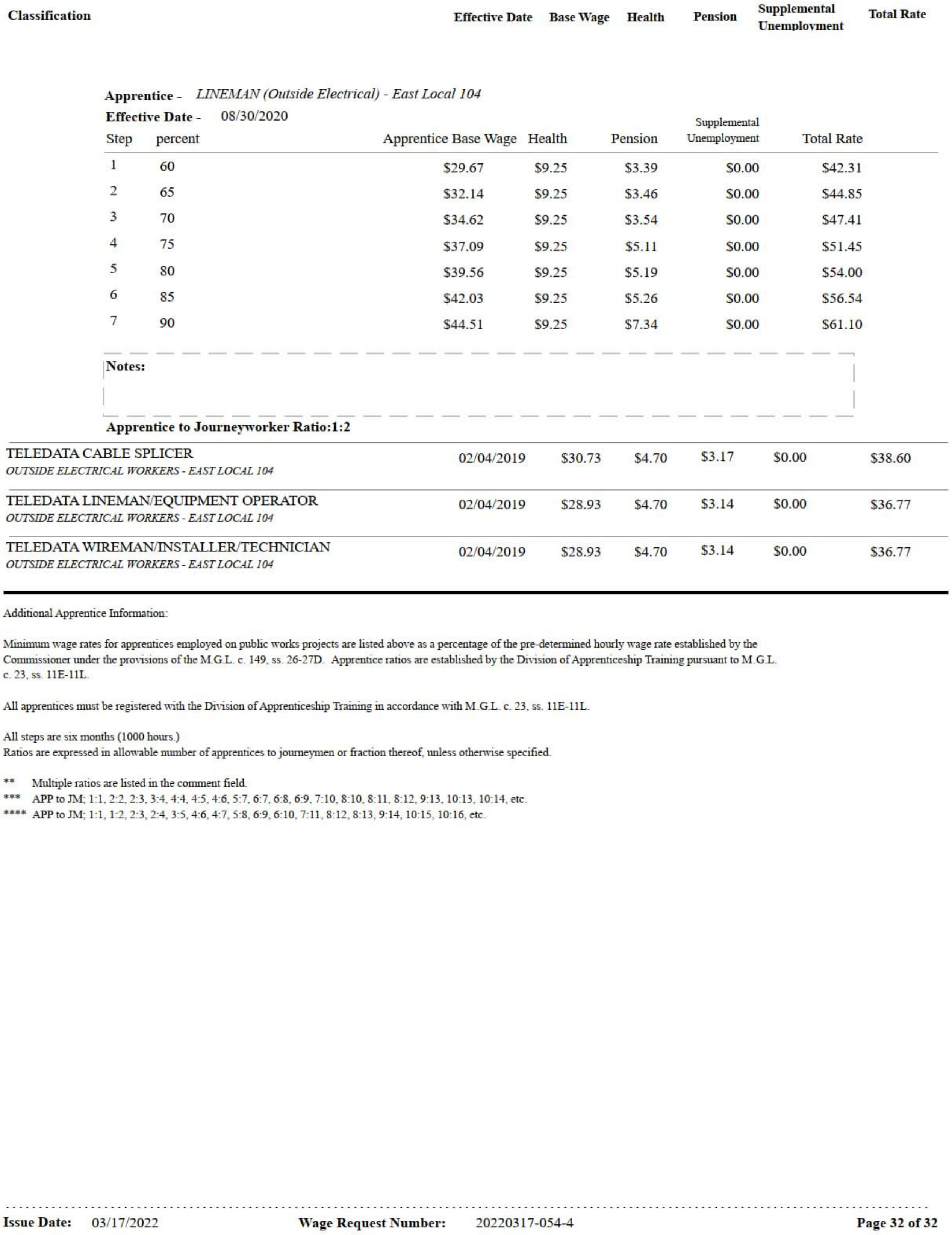
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.34	$0.00	$61.78
2	60	$33.65	$11.39	$22.34	$0.00	$67.38
3	70	$39.26	$11.39	$22.34	$0.00	$72.99
4	80	$44.87	$11.39	$22.34	$0.00	$78.60
5	90	$50.48	$11.39	$22.34	$0.00	$84.21

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.58	$9.10	$17.72	$0.00	$69.40
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.30	$9.10	$17.72	$0.00	$68.12
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$53.41	$9.10	$18.17	$0.00	$80.68
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$55.41	$9.10	$18.17	$0.00	$82.68
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$45.48	$9.10	$18.17	$0.00	$72.75
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$47.48	$9.10	$18.17	$0.00	$74.75
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	03/01/2022	$63.39	$13.57	$17.26	$0.00	$94.22
	09/04/2022	$63.49	$14.07	$18.36	$0.00	$95.92
	02/26/2023	$65.19	$14.07	$18.36	$0.00	$97.62
	09/03/2023	$66.94	$14.07	$18.36	$0.00	$99.37
	03/03/2024	$68.74	$14.07	$18.36	$0.00	$101.17
	09/01/2024	$70.54	$14.07	$18.36	$0.00	$102.97
	03/02/2025	$72.34	$14.07	$18.36	$0.00	$104.77
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

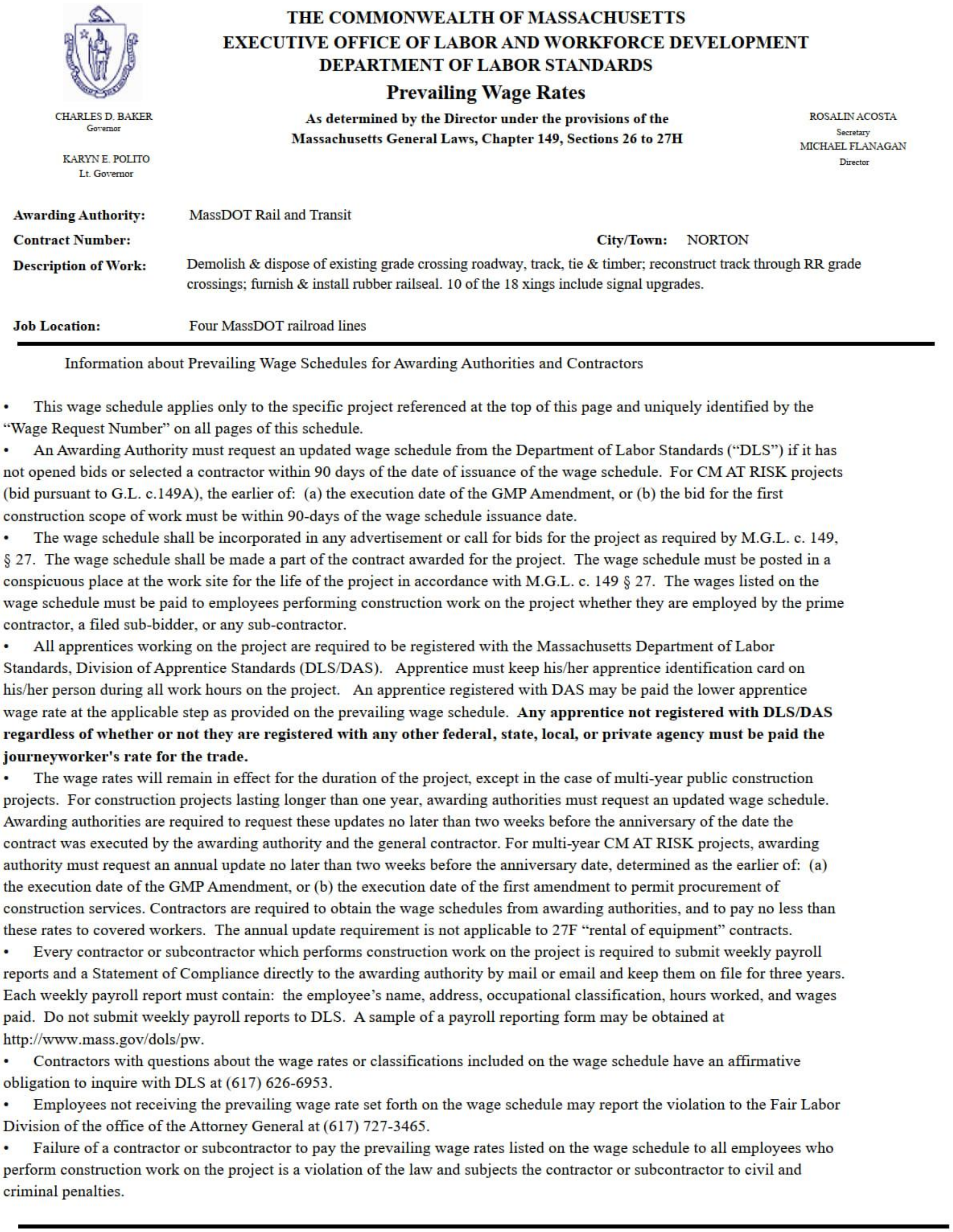
Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

**	Multiple ratios are listed in the comment field.
***	APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
****	APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS
Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Rail and Transit

Contract Number:

City/Town: NORTON

Description of Work: Demolish & dispose of existing grade crossing roadway, track, tie & timber; reconstruct track through RR grade crossings; furnish & install rubber railseal. 10 of the 18 xings include signal upgrades.

Job Location: Four MassDOT railroad lines

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2021	$37.05	$13.41	$16.01	$0.00	$66.47
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2021	$37.12	$13.41	$16.01	$0.00	$66.54
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2021	$37.24	$13.41	$16.01	$0.00	$66.66
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
AIR TRACK OPERATOR *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (FOXBORO)*	02/01/2022	$55.01	$11.39	$21.65	$0.00	$88.05

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Foxboro*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.51	$11.39	$21.65	$0.00	$60.55
2	60	$33.01	$11.39	$21.65	$0.00	$66.05
3	70	$38.51	$11.39	$21.65	$0.00	$71.55
4	80	$44.01	$11.39	$21.65	$0.00	$77.05
5	90	$49.51	$11.39	$21.65	$0.00	$82.55

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.33	$9.10	$17.72	$0.00	$69.15
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2022	$44.53	$8.68	$19.97	$0.00	$73.18
	09/01/2022	$45.18	$8.68	$19.97	$0.00	$73.83
	03/01/2023	$45.78	$8.68	$19.97	$0.00	$74.43

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.27	$8.68	$1.73	$0.00	$32.68
2	60	$26.72	$8.68	$1.73	$0.00	$37.13
3	70	$31.17	$8.68	$14.78	$0.00	$54.63
4	75	$33.40	$8.68	$14.78	$0.00	$56.86
5	80	$35.62	$8.68	$16.51	$0.00	$60.81
6	80	$35.62	$8.68	$16.51	$0.00	$60.81
7	90	$40.08	$8.68	$18.24	$0.00	$67.00
8	90	$40.08	$8.68	$18.24	$0.00	$67.00

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.59	$8.68	$1.73	$0.00	$33.00
2	60	$27.11	$8.68	$1.73	$0.00	$37.52
3	70	$31.63	$8.68	$14.78	$0.00	$55.09
4	75	$33.89	$8.68	$14.78	$0.00	$57.35
5	80	$36.14	$8.68	$16.51	$0.00	$61.33
6	80	$36.14	$8.68	$16.51	$0.00	$61.33
7	90	$40.66	$8.68	$18.24	$0.00	$67.58
8	90	$40.66	$8.68	$18.24	$0.00	$67.58

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $30.45/ 3&4 $36.57/ 5&6 $56.36/ 7&8 $62.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17
All Aspects of New Wood Frame Work						

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (FOXBORO)*	01/01/2020	$44.67	$12.75	$22.41	$0.62	$80.45

Apprentice - *CEMENT MASONRY/PLASTERING - Foxboro*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.34	$12.75	$15.41	$0.00	$50.50
2	60	$26.80	$12.75	$17.41	$0.62	$57.58
3	65	$29.04	$12.75	$18.41	$0.62	$60.82
4	70	$31.27	$12.75	$19.41	$0.62	$64.05
5	75	$33.50	$12.75	$20.41	$0.62	$67.28
6	80	$35.74	$12.75	$21.41	$0.62	$70.52
7	90	$40.20	$12.75	$22.41	$0.62	$75.98

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$52.38	$14.00	$16.05	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25

For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25

For apprentice rates see "Apprentice- LABORER"

DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 223*
Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.46	$10.90	$0.52	$0.00	$28.88
2	45	$19.65	$10.90	$0.59	$0.00	$31.14
3	50	$21.83	$10.90	$0.65	$0.00	$33.38
4	55	$24.01	$10.90	$6.28	$0.00	$41.19
5	60	$26.20	$10.90	$6.77	$0.00	$43.87
6	65	$28.38	$10.90	$7.24	$0.00	$46.52
7	70	$30.56	$10.90	$7.73	$0.00	$49.19
8	75	$32.75	$10.90	$8.21	$0.00	$51.86

Notes:

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*
Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4* For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$46.53	$13.75	$15.80	$0.00	$76.08
	05/01/2022	$47.86	$13.75	$15.80	$0.00	$77.41
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$48.06	$13.75	$15.80	$0.00	$77.61
	05/01/2022	$49.22	$13.75	$15.80	$0.00	$78.77
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2021	$23.16	$13.75	$15.80	$0.00	$52.71
	05/01/2022	$23.83	$13.75	$15.80	$0.00	$53.38

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- ELECTRICIAN"	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$41.76	$14.00	$16.05	$0.00	$71.81
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$24.50	$9.10	$16.64	$0.00	$50.24
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2022	$49.93	$8.68	$20.27	$0.00	$78.88

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.97	$8.68	$1.79	$0.00	$35.44
2	55	$27.46	$8.68	$1.79	$0.00	$37.93
3	60	$29.96	$8.68	$14.90	$0.00	$53.54
4	65	$32.45	$8.68	$14.90	$0.00	$56.03
5	70	$34.95	$8.68	$16.69	$0.00	$60.32
6	75	$37.45	$8.68	$16.69	$0.00	$62.82
7	80	$39.94	$8.68	$18.48	$0.00	$67.10
8	85	$42.44	$8.68	$18.48	$0.00	$69.60

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $32.94/ 3&4 $39.66/ 5&6 $60.32/ 7&8 $67.10

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 1333*	06/01/2020	$39.18	$10.80	$10.45	$0.00	$60.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 1333*
Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.59	$10.80	$1.80	$0.00	$32.19
2	56	$22.04	$10.80	$1.80	$0.00	$34.64
3	63	$24.49	$10.80	$2.45	$0.00	$37.74
4	69	$26.94	$10.80	$2.45	$0.00	$40.19
5	75	$29.39	$10.80	$3.15	$0.00	$43.34
6	81	$31.83	$10.80	$3.15	$0.00	$45.78
7	88	$34.28	$10.80	$10.45	$0.00	$55.53
8	94	$36.73	$10.80	$10.45	$0.00	$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43

Apprentice - *OPERATING ENGINEERS - Local 4*
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.26	$14.00	$0.00	$0.00	$42.26
2	60	$30.83	$14.00	$16.05	$0.00	$60.88
3	65	$33.40	$14.00	$16.05	$0.00	$63.45
4	70	$35.97	$14.00	$16.05	$0.00	$66.02
5	75	$38.54	$14.00	$16.05	$0.00	$68.59
6	80	$41.10	$14.00	$16.05	$0.00	$71.15
7	85	$43.67	$14.00	$16.05	$0.00	$73.72
8	90	$46.24	$14.00	$16.05	$0.00	$76.29

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A* For apprentice rates see "Apprentice- SHEET METAL WORKER"	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- ELECTRICIAN"	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A* For apprentice rates see "Apprentice- SHEET METAL WORKER"	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	09/01/2021	$46.50	$13.80	$17.14	$0.00	$77.44
	09/01/2022	$48.95	$13.80	$17.14	$0.00	$79.89

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Southern MA*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.25	$13.80	$12.42	$0.00	$49.47
2	60	$27.90	$13.80	$13.36	$0.00	$55.06
3	70	$32.55	$13.80	$14.31	$0.00	$60.66
4	80	$37.20	$13.80	$15.25	$0.00	$66.25

Effective Date - 09/01/2022

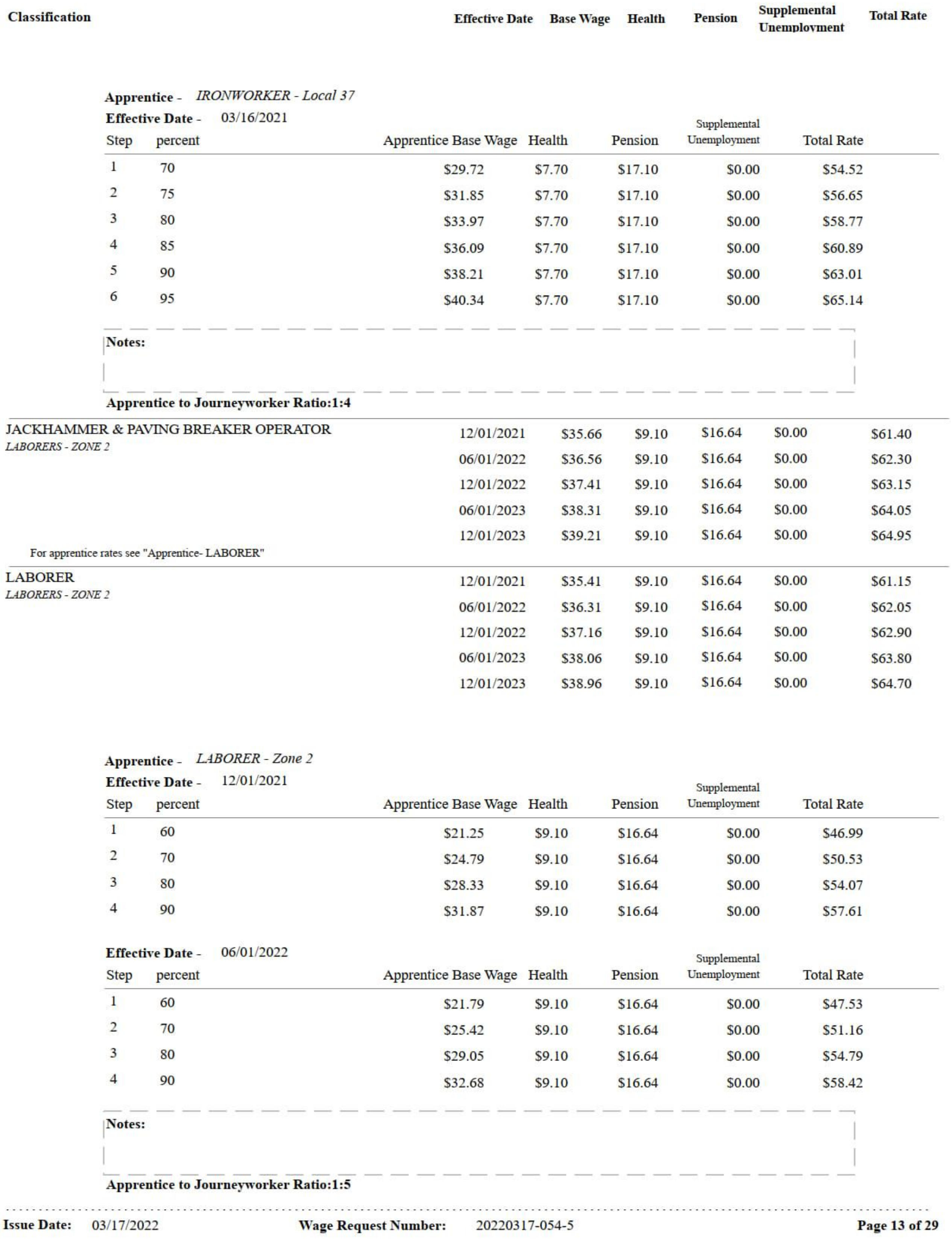
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.48	$13.80	$12.42	$0.00	$50.70
2	60	$29.37	$13.80	$13.36	$0.00	$56.53
3	70	$34.27	$13.80	$14.31	$0.00	$62.38
4	80	$39.16	$13.80	$15.25	$0.00	$68.21

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 37*	03/16/2021	$42.46	$7.70	$17.10	$0.00	$67.26



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 37*

Effective Date - 03/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	$29.72	$7.70	$17.10	$0.00	$54.52
2	75	$31.85	$7.70	$17.10	$0.00	$56.65
3	80	$33.97	$7.70	$17.10	$0.00	$58.77
4	85	$36.09	$7.70	$17.10	$0.00	$60.89
5	90	$38.21	$7.70	$17.10	$0.00	$63.01
6	95	$40.34	$7.70	$17.10	$0.00	$65.14

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Effective Date - 06/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.79	$9.10	$16.64	$0.00	$47.53
2	70	$25.42	$9.10	$16.64	$0.00	$51.16
3	80	$29.05	$9.10	$16.64	$0.00	$54.79
4	90	$32.68	$9.10	$16.64	$0.00	$58.42

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.50	$9.10	$16.70	$0.00	$61.30
	06/01/2022	$36.40	$9.10	$16.70	$0.00	$62.20
	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$43.69	$11.39	$20.37	$0.00	$75.45

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.37	$0.00	$53.61
2	60	$26.21	$11.39	$20.37	$0.00	$57.97
3	70	$30.58	$11.39	$20.37	$0.00	$62.34
4	80	$34.95	$11.39	$20.37	$0.00	$66.71
5	90	$39.32	$11.39	$20.37	$0.00	$71.08

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$57.17	$11.39	$22.31	$0.00	$90.87

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.31	$0.00	$62.29
2	60	$34.30	$11.39	$22.31	$0.00	$68.00
3	70	$40.02	$11.39	$22.31	$0.00	$73.72
4	80	$45.74	$11.39	$22.31	$0.00	$79.44
5	90	$51.45	$11.39	$22.31	$0.00	$85.15

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/03/2022	$40.67	$8.58	$21.57	$0.00	$70.82
	01/02/2023	$41.92	$8.58	$21.57	$0.00	$72.07

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.37	$8.58	$5.72	$0.00	$36.67
2	65	$26.44	$8.58	$17.93	$0.00	$52.95
3	75	$30.50	$8.58	$18.98	$0.00	$58.06
4	85	$34.57	$8.58	$20.01	$0.00	$63.16

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.06	$8.58	$5.72	$0.00	$37.36
2	65	$27.25	$8.58	$17.93	$0.00	$53.76
3	75	$31.44	$8.58	$18.98	$0.00	$59.00
4	85	$35.63	$8.58	$20.01	$0.00	$64.22

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$23.48	$14.00	$16.05	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$28.44	$14.00	$16.05	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$44.56	$8.65	$23.05	$0.00	$76.26
	07/01/2022	$45.76	$8.65	$23.05	$0.00	$77.46
	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.28	$8.65	$0.00	$0.00	$30.93
2	55	$24.51	$8.65	$6.27	$0.00	$39.43
3	60	$26.74	$8.65	$6.84	$0.00	$42.23
4	65	$28.96	$8.65	$7.41	$0.00	$45.02
5	70	$31.19	$8.65	$19.63	$0.00	$59.47
6	75	$33.42	$8.65	$20.20	$0.00	$62.27
7	80	$35.65	$8.65	$20.77	$0.00	$65.07
8	90	$40.10	$8.65	$21.91	$0.00	$70.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$8.65	$0.00	$0.00	$31.53
2	55	$25.17	$8.65	$6.27	$0.00	$40.09
3	60	$27.46	$8.65	$6.84	$0.00	$42.95
4	65	$29.74	$8.65	$7.41	$0.00	$45.80
5	70	$32.03	$8.65	$19.63	$0.00	$60.31
6	75	$34.32	$8.65	$20.20	$0.00	$63.17
7	80	$36.61	$8.65	$20.77	$0.00	$66.03
8	90	$41.18	$8.65	$21.91	$0.00	$71.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$42.62	$8.65	$23.05	$0.00	$74.32
	07/01/2022	$43.82	$8.65	$23.05	$0.00	$75.52
	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.31	$8.65	$0.00	$0.00	$29.96
2	55	$23.44	$8.65	$6.27	$0.00	$38.36
3	60	$25.57	$8.65	$6.84	$0.00	$41.06
4	65	$27.70	$8.65	$7.41	$0.00	$43.76
5	70	$29.83	$8.65	$19.63	$0.00	$58.11
6	75	$31.97	$8.65	$20.20	$0.00	$60.82
7	80	$34.10	$8.65	$20.77	$0.00	$63.52
8	90	$38.36	$8.65	$21.91	$0.00	$68.92

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$8.65	$0.00	$0.00	$30.56
2	55	$24.10	$8.65	$6.27	$0.00	$39.02
3	60	$26.29	$8.65	$6.84	$0.00	$41.78
4	65	$28.48	$8.65	$7.41	$0.00	$44.54
5	70	$30.67	$8.65	$19.63	$0.00	$58.95
6	75	$32.87	$8.65	$20.20	$0.00	$61.72
7	80	$35.06	$8.65	$20.77	$0.00	$64.48
8	90	$39.44	$8.65	$21.91	$0.00	$70.00

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$41.22	$8.65	$23.05	$0.00	$72.92
	07/01/2022	$42.42	$8.65	$23.05	$0.00	$74.12
	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.61	$8.65	$0.00	$0.00	$29.26
2	55	$22.67	$8.65	$6.27	$0.00	$37.59
3	60	$24.73	$8.65	$6.84	$0.00	$40.22
4	65	$26.79	$8.65	$7.41	$0.00	$42.85
5	70	$28.85	$8.65	$19.63	$0.00	$57.13
6	75	$30.92	$8.65	$20.20	$0.00	$59.77
7	80	$32.98	$8.65	$20.77	$0.00	$62.40
8	90	$37.10	$8.65	$21.91	$0.00	$67.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.21	$8.65	$0.00	$0.00	$29.86
2	55	$23.33	$8.65	$6.27	$0.00	$38.25
3	60	$25.45	$8.65	$6.84	$0.00	$40.94
4	65	$27.57	$8.65	$7.41	$0.00	$43.63
5	70	$29.69	$8.65	$19.63	$0.00	$57.97
6	75	$31.82	$8.65	$20.20	$0.00	$60.67
7	80	$33.94	$8.65	$20.77	$0.00	$63.36
8	90	$38.18	$8.65	$21.91	$0.00	$68.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2021	$36.88	$13.41	$16.01	$0.00	$66.30
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$9.40	$23.12	$0.00	$57.06
2	60	$29.44	$9.40	$23.12	$0.00	$61.96
3	70	$34.35	$9.40	$23.12	$0.00	$66.87
4	75	$36.80	$9.40	$23.12	$0.00	$69.32
5	80	$39.26	$9.40	$23.12	$0.00	$71.78
6	80	$39.26	$9.40	$23.12	$0.00	$71.78
7	90	$44.16	$9.40	$23.12	$0.00	$76.68
8	90	$44.16	$9.40	$23.12	$0.00	$76.68

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $34.01/ 3&4 $41.46/ 5&6 $62.80/ 7&8 $69.25

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PLUMBER & PIPEFITTER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

Apprentice - *PLUMBER/PIPEFITTER - Local 51*

Effective Date - 08/30/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.60	$10.15	$2.50	$0.00	$31.25
2	50	$23.25	$10.15	$2.50	$0.00	$35.90
3	60	$27.89	$10.15	$8.80	$0.00	$46.84
4	70	$32.54	$10.15	$14.08	$0.00	$56.77
5	80	$37.19	$10.15	$17.60	$0.00	$64.94

Notes:

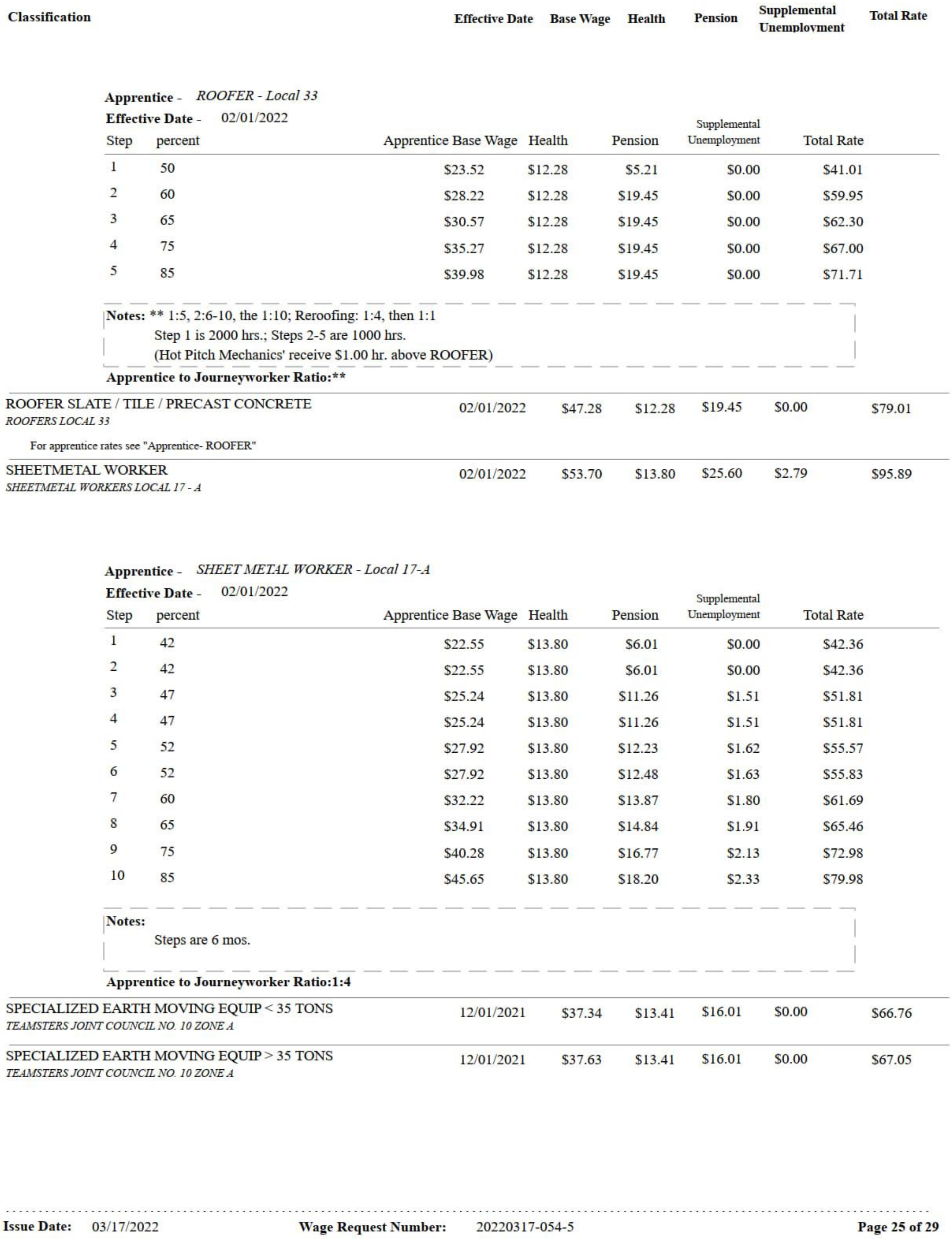
Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
	06/01/2022	$37.31	$9.10	$16.64	$0.00	$63.05
	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2022	$25.75	$9.76	$4.00	$0.00	$39.51
	12/01/2022	$26.40	$10.26	$4.75	$0.00	$41.41
	01/01/2023	$26.40	$10.26	$4.75	$0.00	$41.41
	12/01/2023	$27.00	$10.76	$5.45	$0.00	$43.21
	01/01/2024	$27.00	$10.76	$5.45	$0.00	$43.21
	12/01/2024	$27.60	$11.26	$6.15	$0.00	$45.01
	01/01/2025	$27.60	$11.26	$6.15	$0.00	$45.01
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2022	$47.03	$12.28	$19.45	$0.00	$78.76



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*
Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.52	$12.28	$5.21	$0.00	$41.01
2	60	$28.22	$12.28	$19.45	$0.00	$59.95
3	65	$30.57	$12.28	$19.45	$0.00	$62.30
4	75	$35.27	$12.28	$19.45	$0.00	$67.00
5	85	$39.98	$12.28	$19.45	$0.00	$71.71

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2022	$47.28	$12.28	$19.45	$0.00	$79.01

For apprentice rates see "Apprentice- ROOFER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89

Apprentice - *SHEET METAL WORKER - Local 17-A*
Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$22.55	$13.80	$6.01	$0.00	$42.36
2	42	$22.55	$13.80	$6.01	$0.00	$42.36
3	47	$25.24	$13.80	$11.26	$1.51	$51.81
4	47	$25.24	$13.80	$11.26	$1.51	$51.81
5	52	$27.92	$13.80	$12.23	$1.62	$55.57
6	52	$27.92	$13.80	$12.48	$1.63	$55.83
7	60	$32.22	$13.80	$13.87	$1.80	$61.69
8	65	$34.91	$13.80	$14.84	$1.91	$65.46
9	75	$40.28	$13.80	$16.77	$2.13	$72.98
10	85	$45.65	$13.80	$18.20	$2.33	$79.98

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2021	$37.34	$13.41	$16.01	$0.00	$66.76
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2021	$37.63	$13.41	$16.01	$0.00	$67.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2022	$64.36	$10.44	$22.10	$0.00	$96.90
	10/01/2022	$66.06	$10.44	$22.10	$0.00	$98.60
	03/01/2023	$67.76	$10.44	$22.10	$0.00	$100.30
	10/01/2023	$69.51	$10.44	$22.10	$0.00	$102.05
	03/01/2024	$71.31	$10.44	$22.10	$0.00	$103.85
	10/01/2024	$73.11	$10.44	$22.10	$0.00	$105.65
	03/01/2025	$74.91	$10.44	$22.10	$0.00	$107.45

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$22.53	$10.44	$12.35	$0.00	$45.32
2	40	$25.74	$10.44	$13.10	$0.00	$49.28
3	45	$28.96	$10.44	$13.85	$0.00	$53.25
4	50	$32.18	$10.44	$14.60	$0.00	$57.22
5	55	$35.40	$10.44	$15.35	$0.00	$61.19
6	60	$38.62	$10.44	$16.10	$0.00	$65.16
7	65	$41.83	$10.44	$16.85	$0.00	$69.12
8	70	$45.05	$10.44	$17.60	$0.00	$73.09
9	75	$48.27	$10.44	$18.35	$0.00	$77.06
10	80	$51.49	$10.44	$19.10	$0.00	$81.03

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$23.12	$10.44	$12.35	$0.00	$45.91
2	40	$26.42	$10.44	$13.10	$0.00	$49.96
3	45	$29.73	$10.44	$13.85	$0.00	$54.02
4	50	$33.03	$10.44	$14.60	$0.00	$58.07
5	55	$36.33	$10.44	$15.35	$0.00	$62.12
6	60	$39.64	$10.44	$16.10	$0.00	$66.18
7	65	$42.94	$10.44	$16.85	$0.00	$70.23
8	70	$46.24	$10.44	$17.60	$0.00	$74.28
9	75	$49.55	$10.44	$18.35	$0.00	$78.34
10	80	$52.85	$10.44	$19.10	$0.00	$82.39

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 223*
Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$56.09	$11.39	$22.34	$0.00	$89.82

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*
Effective Date - 02/01/2022

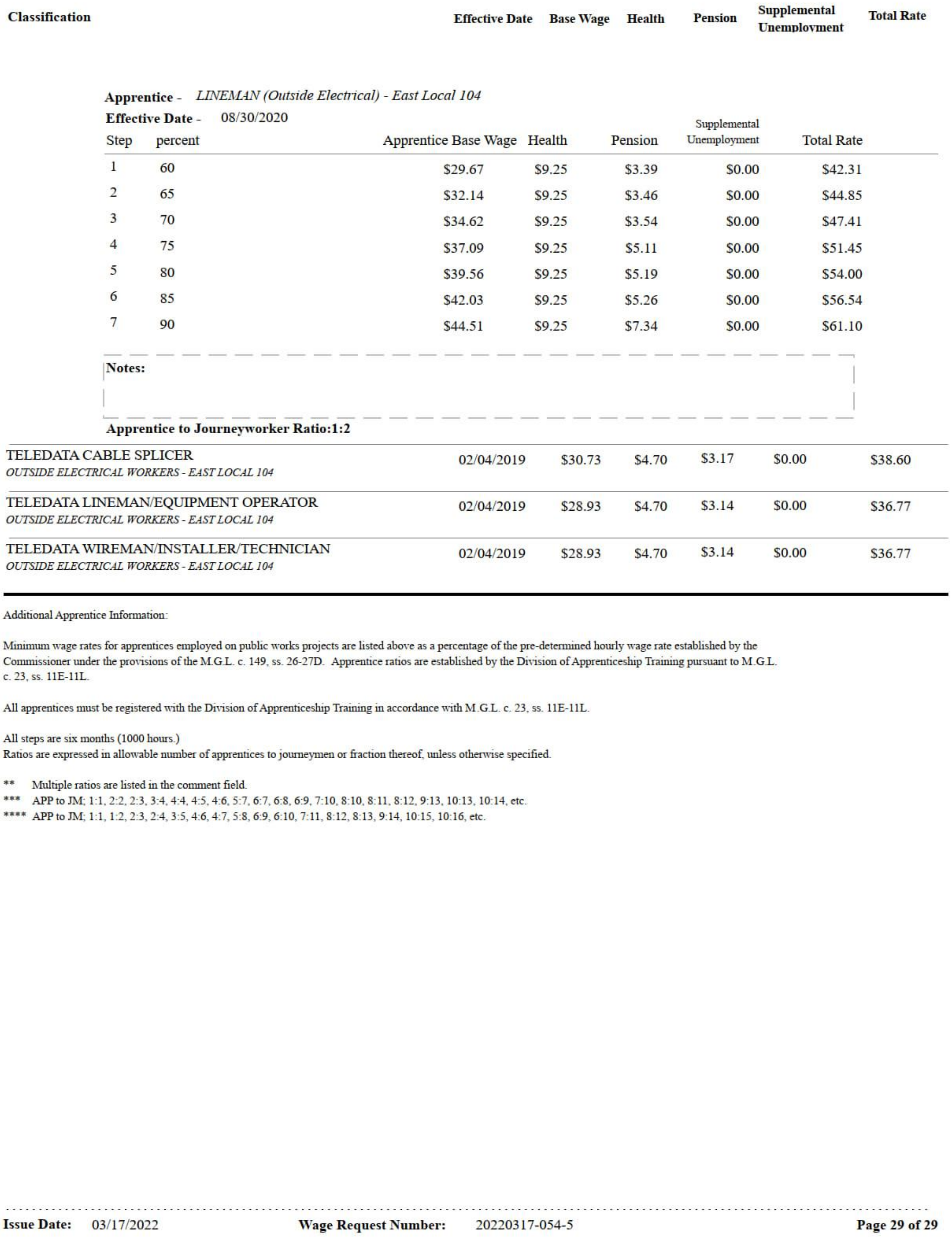
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.34	$0.00	$61.78
2	60	$33.65	$11.39	$22.34	$0.00	$67.38
3	70	$39.26	$11.39	$22.34	$0.00	$72.99
4	80	$44.87	$11.39	$22.34	$0.00	$78.60
5	90	$50.48	$11.39	$22.34	$0.00	$84.21

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.58	$9.10	$17.72	$0.00	$69.40
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.30	$9.10	$17.72	$0.00	$68.12
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2021	$37.92	$13.41	$16.01	$0.00	$67.34
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$53.41	$9.10	$18.17	$0.00	$80.68
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$55.41	$9.10	$18.17	$0.00	$82.68

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	12/01/2021	$45.48	$9.10	$18.17	$0.00	$72.75
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2021	$47.48	$9.10	$18.17	$0.00	$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	12/01/2021	$37.34	$13.41	$16.01	$0.00	$66.76
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18



Apprentice - *LINEMAN (Outside Electrical) - East Local 104*
Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

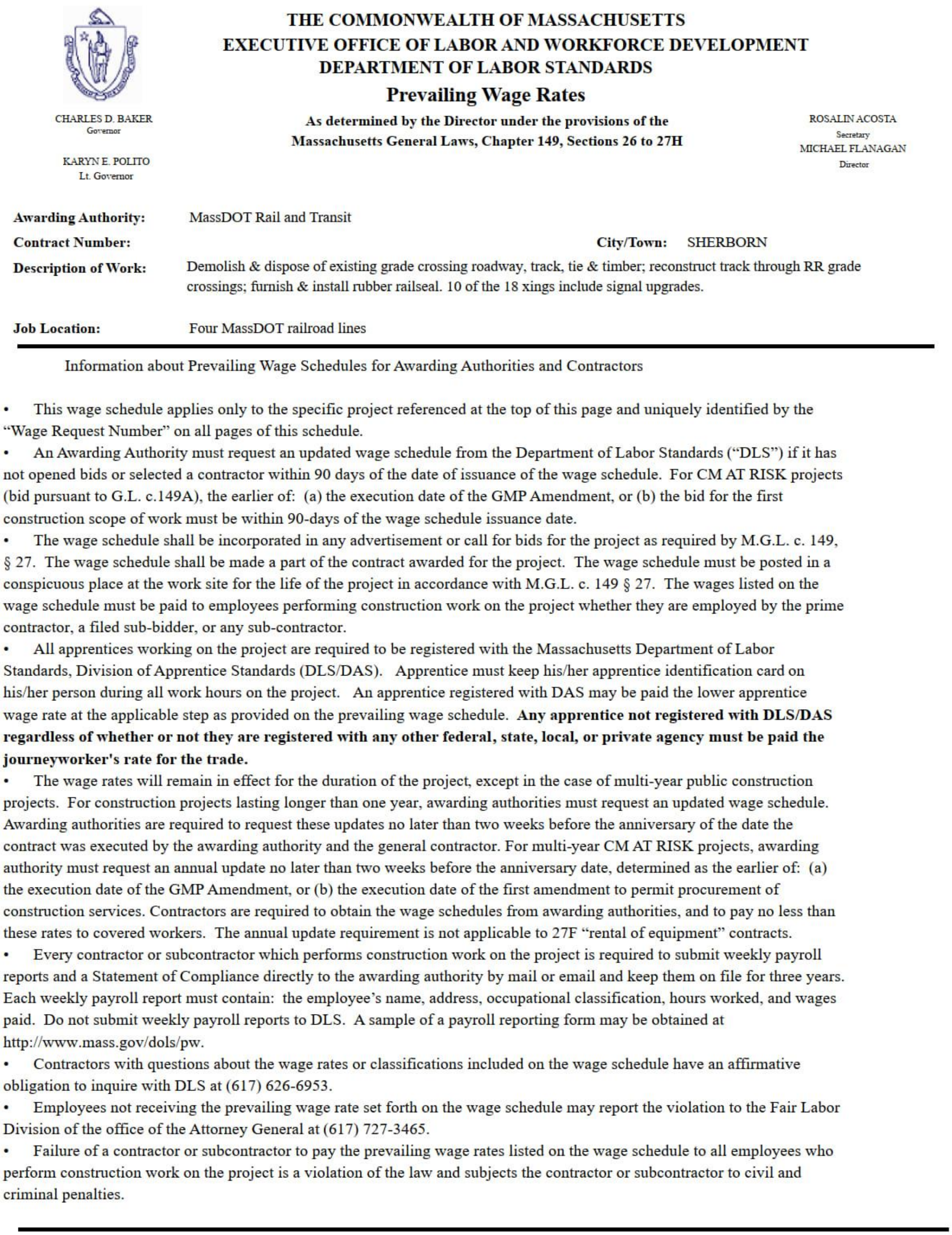
Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Rail and Transit

Contract Number: **City/Town:** SHERBORN

Description of Work: Demolish & dispose of existing grade crossing roadway, track, tie & timber; reconstruct track through RR grade crossings; furnish & install rubber railseal. 10 of the 18 xings include signal upgrades.

Job Location: Four MassDOT railroad lines

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (LOWELL)*	02/01/2022	$55.01	$11.39	$21.65	$0.00	$88.05

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Lowell*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.51	$11.39	$21.65	$0.00	$60.55
2	60	$33.01	$11.39	$21.65	$0.00	$66.05
3	70	$38.51	$11.39	$21.65	$0.00	$71.55
4	80	$44.01	$11.39	$21.65	$0.00	$77.05
5	90	$49.51	$11.39	$21.65	$0.00	$82.55

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.33	$9.10	$17.72	$0.00	$69.15
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2022	$44.53	$8.68	$19.97	$0.00	$73.18
	09/01/2022	$45.18	$8.68	$19.97	$0.00	$73.83
	03/01/2023	$45.78	$8.68	$19.97	$0.00	$74.43

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.27	$8.68	$1.73	$0.00	$32.68
2	60	$26.72	$8.68	$1.73	$0.00	$37.13
3	70	$31.17	$8.68	$14.78	$0.00	$54.63
4	75	$33.40	$8.68	$14.78	$0.00	$56.86
5	80	$35.62	$8.68	$16.51	$0.00	$60.81
6	80	$35.62	$8.68	$16.51	$0.00	$60.81
7	90	$40.08	$8.68	$18.24	$0.00	$67.00
8	90	$40.08	$8.68	$18.24	$0.00	$67.00

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.59	$8.68	$1.73	$0.00	$33.00
2	60	$27.11	$8.68	$1.73	$0.00	$37.52
3	70	$31.63	$8.68	$14.78	$0.00	$55.09
4	75	$33.89	$8.68	$14.78	$0.00	$57.35
5	80	$36.14	$8.68	$16.51	$0.00	$61.33
6	80	$36.14	$8.68	$16.51	$0.00	$61.33
7	90	$40.66	$8.68	$18.24	$0.00	$67.58
8	90	$40.66	$8.68	$18.24	$0.00	$67.58

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $30.45/ 3&4 $36.57/ 5&6 $56.36/ 7&8 $62.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17

All Aspects of New Wood Frame Work

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (LOWELL)*	01/01/2020	$45.23	$12.75	$22.41	$0.62	$81.01

Apprentice - *CEMENT MASONRY/PLASTERING - Lowell*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.62	$12.75	$15.41	$0.00	$50.78
2	60	$27.14	$12.75	$17.41	$0.62	$57.92
3	65	$29.40	$12.75	$18.41	$0.62	$61.18
4	70	$31.66	$12.75	$19.41	$0.62	$64.44
5	75	$33.92	$12.75	$20.41	$0.62	$67.70
6	80	$36.18	$12.75	$21.41	$0.62	$70.96
7	90	$40.71	$12.75	$22.41	$0.62	$76.49

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$52.38	$14.00	$16.05	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 103*	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.93	$13.00	$0.69	$0.00	$36.62
2	40	$22.93	$13.00	$0.69	$0.00	$36.62
3	45	$25.79	$13.00	$15.62	$0.00	$54.41
4	45	$25.79	$13.00	$15.62	$0.00	$54.41
5	50	$28.66	$13.00	$16.10	$0.00	$57.76
6	55	$31.53	$13.00	$16.58	$0.00	$61.11
7	60	$34.39	$13.00	$17.04	$0.00	$64.43
8	65	$37.26	$13.00	$17.52	$0.00	$67.78
9	70	$40.12	$13.00	$17.98	$0.00	$71.10
10	75	$42.99	$13.00	$18.46	$0.00	$74.45

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$23.50	$13.00	$0.71	$0.00	$37.21
2	40	$23.50	$13.00	$0.71	$0.00	$37.21
3	45	$26.44	$13.00	$15.64	$0.00	$55.08
4	45	$26.44	$13.00	$15.64	$0.00	$55.08
5	50	$29.38	$13.00	$16.12	$0.00	$58.50
6	55	$32.32	$13.00	$16.60	$0.00	$61.92
7	60	$35.26	$13.00	$17.07	$0.00	$65.33
8	65	$38.19	$13.00	$17.55	$0.00	$68.74
9	70	$41.13	$13.00	$18.01	$0.00	$72.14
10	75	$44.07	$13.00	$18.49	$0.00	$75.56

Notes: :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4* For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$46.53	$13.75	$15.80	$0.00	$76.08
	05/01/2022	$47.86	$13.75	$15.80	$0.00	$77.41
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$48.06	$13.75	$15.80	$0.00	$77.61
	05/01/2022	$49.22	$13.75	$15.80	$0.00	$78.77
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$23.16	$13.75	$15.80	$0.00	$52.71
	05/01/2022	$23.83	$13.75	$15.80	$0.00	$53.38
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103* For apprentice rates see "Apprentice- ELECTRICIAN"	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 103* For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"	03/01/2022	$44.71	$13.00	$18.74	$0.00	$76.45
	09/01/2022	$46.42	$13.00	$18.87	$0.00	$78.29
	03/01/2023	$48.34	$13.00	$19.01	$0.00	$80.35
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$41.76	$14.00	$16.05	$0.00	$71.81
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$24.50	$9.10	$16.64	$0.00	$50.24
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2022	$49.93	$8.68	$20.27	$0.00	$78.88

Apprentice - *FLOORCOVERER - Local 2168 Zone I*
Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.97	$8.68	$1.79	$0.00	$35.44
2	55	$27.46	$8.68	$1.79	$0.00	$37.93
3	60	$29.96	$8.68	$14.90	$0.00	$53.54
4	65	$32.45	$8.68	$14.90	$0.00	$56.03
5	70	$34.95	$8.68	$16.69	$0.00	$60.32
6	75	$37.45	$8.68	$16.69	$0.00	$62.82
7	80	$39.94	$8.68	$18.48	$0.00	$67.10
8	85	$42.44	$8.68	$18.48	$0.00	$69.60

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $32.94/ 3&4 $39.66/ 5&6 $60.32/ 7&8 $67.10

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43

Apprentice - *OPERATING ENGINEERS - Local 4*

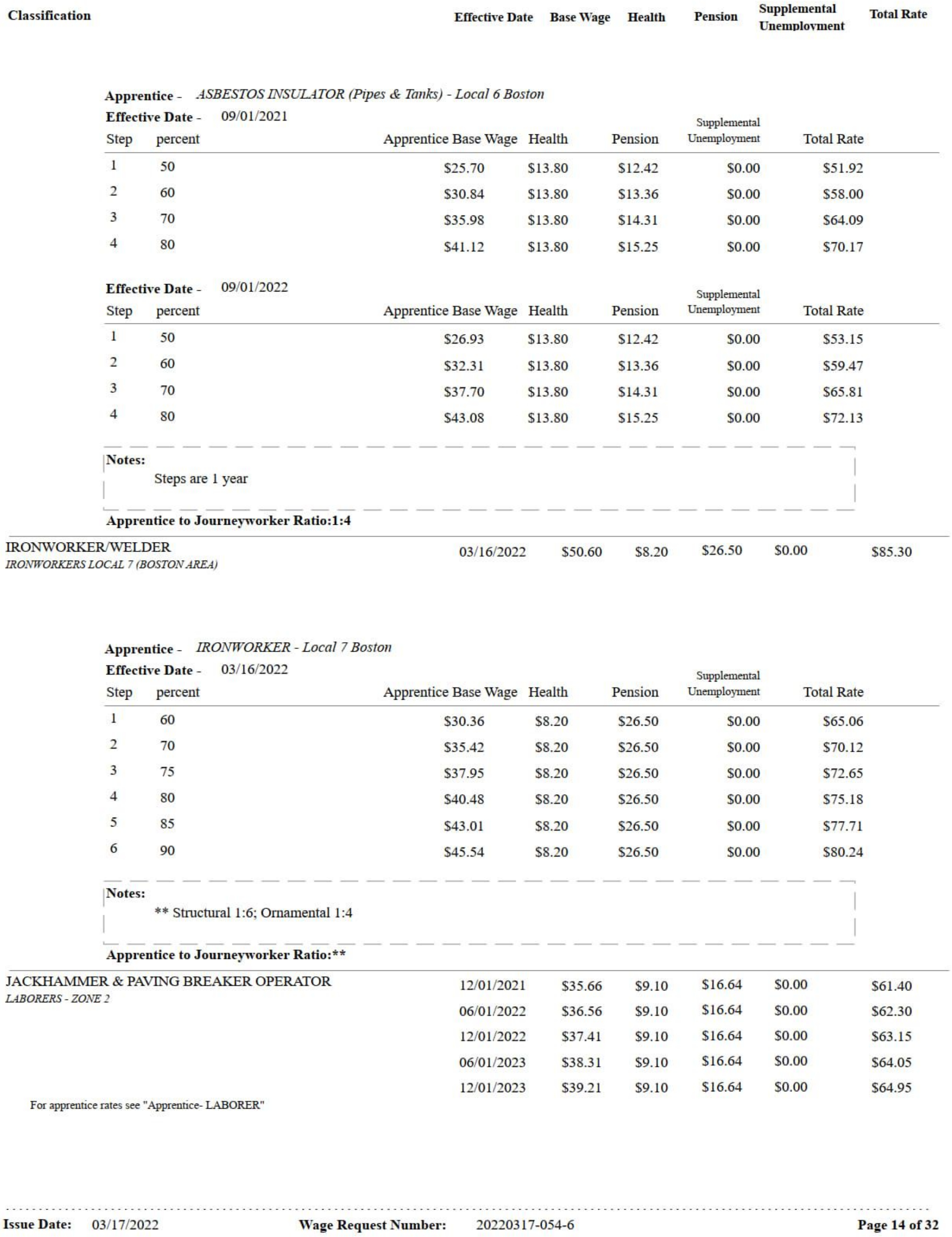
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.26	$14.00	$0.00	$0.00	$42.26
2	60	$30.83	$14.00	$16.05	$0.00	$60.88
3	65	$33.40	$14.00	$16.05	$0.00	$63.45
4	70	$35.97	$14.00	$16.05	$0.00	$66.02
5	75	$38.54	$14.00	$16.05	$0.00	$68.59
6	80	$41.10	$14.00	$16.05	$0.00	$71.15
7	85	$43.67	$14.00	$16.05	$0.00	$73.72
8	90	$46.24	$14.00	$16.05	$0.00	$76.29

Notes:

Apprentice to Journeyworker Ratio:1:6

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	03/01/2022	$57.32	$13.00	$20.82	$0.00	$91.14
	09/01/2022	$58.76	$13.00	$20.86	$0.00	$92.62
	03/01/2023	$60.43	$13.00	$20.91	$0.00	$94.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2021	$51.40	$13.80	$17.14	$0.00	$82.34
	09/01/2022	$53.85	$13.80	$17.14	$0.00	$84.79



Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.70	$13.80	$12.42	$0.00	$51.92
2	60	$30.84	$13.80	$13.36	$0.00	$58.00
3	70	$35.98	$13.80	$14.31	$0.00	$64.09
4	80	$41.12	$13.80	$15.25	$0.00	$70.17

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.93	$13.80	$12.42	$0.00	$53.15
2	60	$32.31	$13.80	$13.36	$0.00	$59.47
3	70	$37.70	$13.80	$14.31	$0.00	$65.81
4	80	$43.08	$13.80	$15.25	$0.00	$72.13

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	03/16/2022	$50.60	$8.20	$26.50	$0.00	$85.30

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 03/16/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$30.36	$8.20	$26.50	$0.00	$65.06
2	70	$35.42	$8.20	$26.50	$0.00	$70.12
3	75	$37.95	$8.20	$26.50	$0.00	$72.65
4	80	$40.48	$8.20	$26.50	$0.00	$75.18
5	85	$43.01	$8.20	$26.50	$0.00	$77.71
6	90	$45.54	$8.20	$26.50	$0.00	$80.24

Notes:

** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Effective Date - 06/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.79	$9.10	$16.64	$0.00	$47.53
2	70	$25.42	$9.10	$16.64	$0.00	$51.16
3	80	$29.05	$9.10	$16.64	$0.00	$54.79
4	90	$32.68	$9.10	$16.64	$0.00	$58.42

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.50	$9.10	$16.70	$0.00	$61.30
	06/01/2022	$36.40	$9.10	$16.70	$0.00	$62.20
	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$43.69	$11.39	$20.37	$0.00	$75.45

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.37	$0.00	$53.61
2	60	$26.21	$11.39	$20.37	$0.00	$57.97
3	70	$30.58	$11.39	$20.37	$0.00	$62.34
4	80	$34.95	$11.39	$20.37	$0.00	$66.71
5	90	$39.32	$11.39	$20.37	$0.00	$71.08

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$57.17	$11.39	$22.31	$0.00	$90.87

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.31	$0.00	$62.29
2	60	$34.30	$11.39	$22.31	$0.00	$68.00
3	70	$40.02	$11.39	$22.31	$0.00	$73.72
4	80	$45.74	$11.39	$22.31	$0.00	$79.44
5	90	$51.45	$11.39	$22.31	$0.00	$85.15

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/03/2022	$40.67	$8.58	$21.57	$0.00	$70.82
	01/02/2023	$41.92	$8.58	$21.57	$0.00	$72.07

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.37	$8.58	$5.72	$0.00	$36.67
2	65	$26.44	$8.58	$17.93	$0.00	$52.95
3	75	$30.50	$8.58	$18.98	$0.00	$58.06
4	85	$34.57	$8.58	$20.01	$0.00	$63.16

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.06	$8.58	$5.72	$0.00	$37.36
2	65	$27.25	$8.58	$17.93	$0.00	$53.76
3	75	$31.44	$8.58	$18.98	$0.00	$59.00
4	85	$35.63	$8.58	$20.01	$0.00	$64.22

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$23.48	$14.00	$16.05	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$28.44	$14.00	$16.05	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$44.56	$8.65	$23.05	$0.00	$76.26
	07/01/2022	$45.76	$8.65	$23.05	$0.00	$77.46
	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.28	$8.65	$0.00	$0.00	$30.93
2	55	$24.51	$8.65	$6.27	$0.00	$39.43
3	60	$26.74	$8.65	$6.84	$0.00	$42.23
4	65	$28.96	$8.65	$7.41	$0.00	$45.02
5	70	$31.19	$8.65	$19.63	$0.00	$59.47
6	75	$33.42	$8.65	$20.20	$0.00	$62.27
7	80	$35.65	$8.65	$20.77	$0.00	$65.07
8	90	$40.10	$8.65	$21.91	$0.00	$70.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$8.65	$0.00	$0.00	$31.53
2	55	$25.17	$8.65	$6.27	$0.00	$40.09
3	60	$27.46	$8.65	$6.84	$0.00	$42.95
4	65	$29.74	$8.65	$7.41	$0.00	$45.80
5	70	$32.03	$8.65	$19.63	$0.00	$60.31
6	75	$34.32	$8.65	$20.20	$0.00	$63.17
7	80	$36.61	$8.65	$20.77	$0.00	$66.03
8	90	$41.18	$8.65	$21.91	$0.00	$71.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$42.62	$8.65	$23.05	$0.00	$74.32
	07/01/2022	$43.82	$8.65	$23.05	$0.00	$75.52
	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.31	$8.65	$0.00	$0.00	$29.96
2	55	$23.44	$8.65	$6.27	$0.00	$38.36
3	60	$25.57	$8.65	$6.84	$0.00	$41.06
4	65	$27.70	$8.65	$7.41	$0.00	$43.76
5	70	$29.83	$8.65	$19.63	$0.00	$58.11
6	75	$31.97	$8.65	$20.20	$0.00	$60.82
7	80	$34.10	$8.65	$20.77	$0.00	$63.52
8	90	$38.36	$8.65	$21.91	$0.00	$68.92

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$8.65	$0.00	$0.00	$30.56
2	55	$24.10	$8.65	$6.27	$0.00	$39.02
3	60	$26.29	$8.65	$6.84	$0.00	$41.78
4	65	$28.48	$8.65	$7.41	$0.00	$44.54
5	70	$30.67	$8.65	$19.63	$0.00	$58.95
6	75	$32.87	$8.65	$20.20	$0.00	$61.72
7	80	$35.06	$8.65	$20.77	$0.00	$64.48
8	90	$39.44	$8.65	$21.91	$0.00	$70.00

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$41.22	$8.65	$23.05	$0.00	$72.92
	07/01/2022	$42.42	$8.65	$23.05	$0.00	$74.12
	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.61	$8.65	$0.00	$0.00	$29.26
2	55	$22.67	$8.65	$6.27	$0.00	$37.59
3	60	$24.73	$8.65	$6.84	$0.00	$40.22
4	65	$26.79	$8.65	$7.41	$0.00	$42.85
5	70	$28.85	$8.65	$19.63	$0.00	$57.13
6	75	$30.92	$8.65	$20.20	$0.00	$59.77
7	80	$32.98	$8.65	$20.77	$0.00	$62.40
8	90	$37.10	$8.65	$21.91	$0.00	$67.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.21	$8.65	$0.00	$0.00	$29.86
2	55	$23.33	$8.65	$6.27	$0.00	$38.25
3	60	$25.45	$8.65	$6.84	$0.00	$40.94
4	65	$27.57	$8.65	$7.41	$0.00	$43.63
5	70	$29.69	$8.65	$19.63	$0.00	$57.97
6	75	$31.82	$8.65	$20.20	$0.00	$60.67
7	80	$33.94	$8.65	$20.77	$0.00	$63.36
8	90	$38.18	$8.65	$21.91	$0.00	$68.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*
Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$9.40	$23.12	$0.00	$57.06
2	60	$29.44	$9.40	$23.12	$0.00	$61.96
3	70	$34.35	$9.40	$23.12	$0.00	$66.87
4	75	$36.80	$9.40	$23.12	$0.00	$69.32
5	80	$39.26	$9.40	$23.12	$0.00	$71.78
6	80	$39.26	$9.40	$23.12	$0.00	$71.78
7	90	$44.16	$9.40	$23.12	$0.00	$76.68
8	90	$44.16	$9.40	$23.12	$0.00	$76.68

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $34.01/ 3&4 $41.46/ 5&6 $62.80/ 7&8 $69.25

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88

Apprentice - *PIPEFITTER - Local 537*
Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$23.18	$11.70	$8.25	$0.00	$43.13
2	45	$26.07	$11.70	$20.24	$0.00	$58.01
3	60	$34.76	$11.70	$20.24	$0.00	$66.70
4	70	$40.56	$11.70	$20.24	$0.00	$72.50
5	80	$46.35	$11.70	$20.24	$0.00	$78.29

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	03/01/2022	$61.79	$14.07	$18.36	$0.00	$94.22
	09/04/2022	$63.49	$14.07	$18.36	$0.00	$95.92
	02/26/2023	$65.19	$14.07	$18.36	$0.00	$97.62
	09/03/2023	$66.94	$14.07	$18.36	$0.00	$99.37
	03/03/2024	$68.74	$14.07	$18.36	$0.00	$101.17
	09/01/2024	$70.54	$14.07	$18.36	$0.00	$102.97
	03/02/2025	$72.34	$14.07	$18.36	$0.00	$104.77

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$21.63	$14.07	$6.63	$0.00	$42.33
2	40	$24.72	$14.07	$7.52	$0.00	$46.31
3	55	$33.98	$14.07	$10.24	$0.00	$58.29
4	65	$40.16	$14.07	$12.04	$0.00	$66.27
5	75	$46.34	$14.07	$13.85	$0.00	$74.26

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$22.22	$14.07	$6.63	$0.00	$42.92
2	40	$25.40	$14.07	$7.52	$0.00	$46.99
3	55	$34.92	$14.07	$10.24	$0.00	$59.23
4	65	$41.27	$14.07	$12.04	$0.00	$67.38
5	75	$47.62	$14.07	$13.85	$0.00	$75.54

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$69.00, Step5 with lic$76.87

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	03/01/2021	$57.94	$11.70	$20.24	$0.00	$89.88

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
	06/01/2022	$37.31	$9.10	$16.64	$0.00	$63.05
	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70

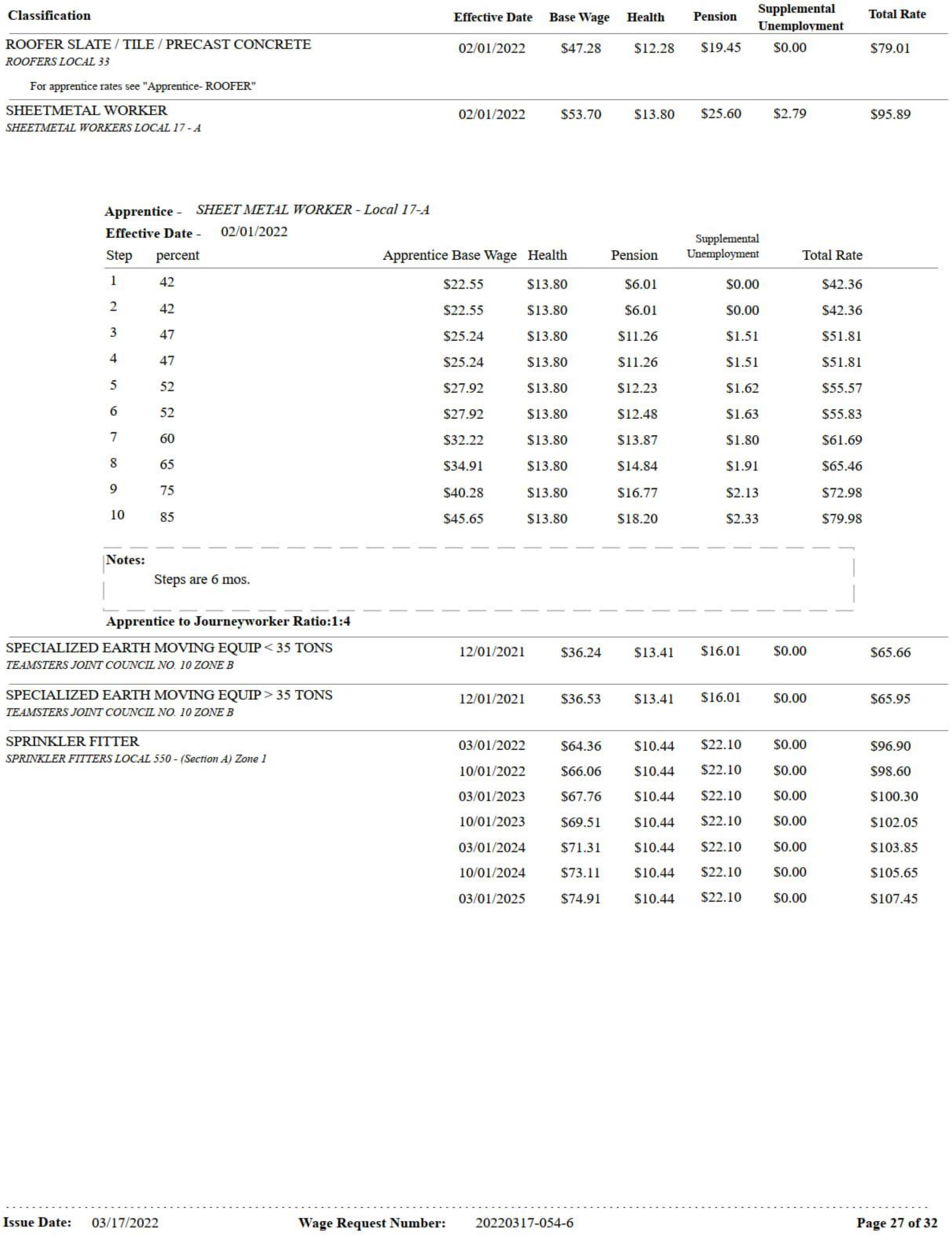
Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2022	$25.75	$9.76	$4.00	$0.00	$39.51
	12/01/2022	$26.40	$10.26	$4.75	$0.00	$41.41
	01/01/2023	$26.40	$10.26	$4.75	$0.00	$41.41
	12/01/2023	$27.00	$10.76	$5.45	$0.00	$43.21
	01/01/2024	$27.00	$10.76	$5.45	$0.00	$43.21
	12/01/2024	$27.60	$11.26	$6.15	$0.00	$45.01
	01/01/2025	$27.60	$11.26	$6.15	$0.00	$45.01
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2022	$47.03	$12.28	$19.45	$0.00	$78.76

Apprentice - *ROOFER - Local 33*
Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.52	$12.28	$5.21	$0.00	$41.01
2	60	$28.22	$12.28	$19.45	$0.00	$59.95
3	65	$30.57	$12.28	$19.45	$0.00	$62.30
4	75	$35.27	$12.28	$19.45	$0.00	$67.00
5	85	$39.98	$12.28	$19.45	$0.00	$71.71

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2022	$47.28	$12.28	$19.45	$0.00	$79.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 02/01/2022

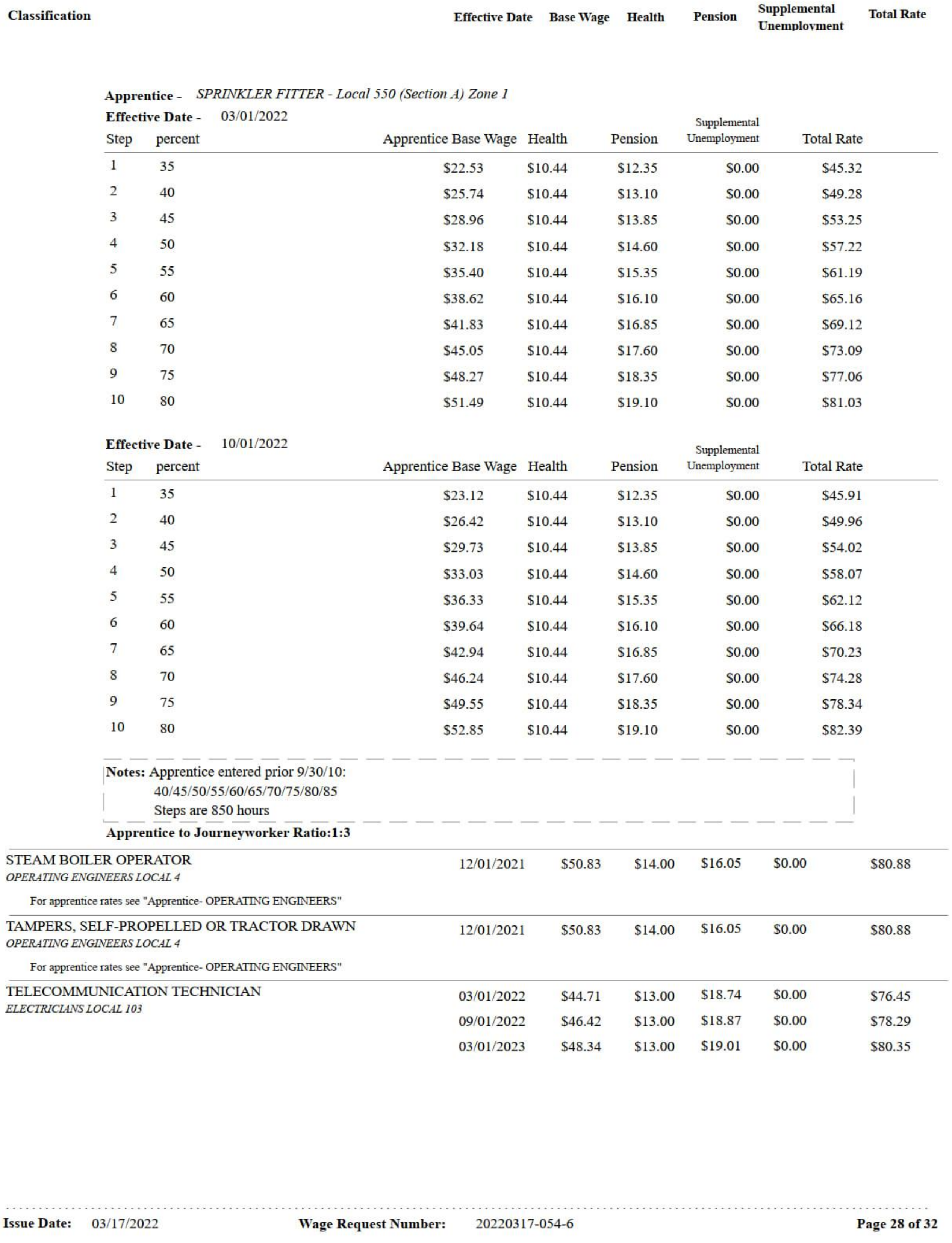
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$22.55	$13.80	$6.01	$0.00	$42.36
2	42	$22.55	$13.80	$6.01	$0.00	$42.36
3	47	$25.24	$13.80	$11.26	$1.51	$51.81
4	47	$25.24	$13.80	$11.26	$1.51	$51.81
5	52	$27.92	$13.80	$12.23	$1.62	$55.57
6	52	$27.92	$13.80	$12.48	$1.63	$55.83
7	60	$32.22	$13.80	$13.87	$1.80	$61.69
8	65	$34.91	$13.80	$14.84	$1.91	$65.46
9	75	$40.28	$13.80	$16.77	$2.13	$72.98
10	85	$45.65	$13.80	$18.20	$2.33	$79.98

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2022	$64.36	$10.44	$22.10	$0.00	$96.90
	10/01/2022	$66.06	$10.44	$22.10	$0.00	$98.60
	03/01/2023	$67.76	$10.44	$22.10	$0.00	$100.30
	10/01/2023	$69.51	$10.44	$22.10	$0.00	$102.05
	03/01/2024	$71.31	$10.44	$22.10	$0.00	$103.85
	10/01/2024	$73.11	$10.44	$22.10	$0.00	$105.65
	03/01/2025	$74.91	$10.44	$22.10	$0.00	$107.45



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$22.53	$10.44	$12.35	$0.00	$45.32
2	40	$25.74	$10.44	$13.10	$0.00	$49.28
3	45	$28.96	$10.44	$13.85	$0.00	$53.25
4	50	$32.18	$10.44	$14.60	$0.00	$57.22
5	55	$35.40	$10.44	$15.35	$0.00	$61.19
6	60	$38.62	$10.44	$16.10	$0.00	$65.16
7	65	$41.83	$10.44	$16.85	$0.00	$69.12
8	70	$45.05	$10.44	$17.60	$0.00	$73.09
9	75	$48.27	$10.44	$18.35	$0.00	$77.06
10	80	$51.49	$10.44	$19.10	$0.00	$81.03

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$23.12	$10.44	$12.35	$0.00	$45.91
2	40	$26.42	$10.44	$13.10	$0.00	$49.96
3	45	$29.73	$10.44	$13.85	$0.00	$54.02
4	50	$33.03	$10.44	$14.60	$0.00	$58.07
5	55	$36.33	$10.44	$15.35	$0.00	$62.12
6	60	$39.64	$10.44	$16.10	$0.00	$66.18
7	65	$42.94	$10.44	$16.85	$0.00	$70.23
8	70	$46.24	$10.44	$17.60	$0.00	$74.28
9	75	$49.55	$10.44	$18.35	$0.00	$78.34
10	80	$52.85	$10.44	$19.10	$0.00	$82.39

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	03/01/2022	$44.71	$13.00	$18.74	$0.00	$76.45
	09/01/2022	$46.42	$13.00	$18.87	$0.00	$78.29
	03/01/2023	$48.34	$13.00	$19.01	$0.00	$80.35

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$20.12	$13.00	$0.60	$0.00	$33.72
2	45	$20.12	$13.00	$0.60	$0.00	$33.72
3	50	$22.36	$13.00	$15.06	$0.00	$50.42
4	50	$22.36	$13.00	$15.06	$0.00	$50.42
5	55	$24.59	$13.00	$15.43	$0.00	$53.02
6	60	$26.83	$13.00	$15.79	$0.00	$55.62
7	65	$29.06	$13.00	$16.16	$0.00	$58.22
8	70	$31.30	$13.00	$16.53	$0.00	$60.83
9	75	$33.53	$13.00	$16.91	$0.00	$63.44
10	80	$35.77	$13.00	$17.27	$0.00	$66.04

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$20.89	$13.00	$0.63	$0.00	$34.52
2	45	$20.89	$13.00	$0.63	$0.00	$34.52
3	50	$23.21	$13.00	$15.13	$0.00	$51.34
4	50	$23.21	$13.00	$15.13	$0.00	$51.34
5	55	$25.53	$13.00	$15.51	$0.00	$54.04
6	60	$27.85	$13.00	$15.88	$0.00	$56.73
7	65	$30.17	$13.00	$16.26	$0.00	$59.43
8	70	$32.49	$13.00	$16.62	$0.00	$62.11
9	75	$34.82	$13.00	$17.00	$0.00	$64.82
10	80	$37.14	$13.00	$17.37	$0.00	$67.51

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$56.09	$11.39	$22.34	$0.00	$89.82

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.34	$0.00	$61.78
2	60	$33.65	$11.39	$22.34	$0.00	$67.38
3	70	$39.26	$11.39	$22.34	$0.00	$72.99
4	80	$44.87	$11.39	$22.34	$0.00	$78.60
5	90	$50.48	$11.39	$22.34	$0.00	$84.21

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.58	$9.10	$17.72	$0.00	$69.40
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.30	$9.10	$17.72	$0.00	$68.12
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$53.41	$9.10	$18.17	$0.00	$80.68
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$55.41	$9.10	$18.17	$0.00	$82.68
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$45.48	$9.10	$18.17	$0.00	$72.75
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$47.48	$9.10	$18.17	$0.00	$74.75
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	03/01/2022	$63.39	$13.57	$17.26	$0.00	$94.22
	09/04/2022	$63.49	$14.07	$18.36	$0.00	$95.92
	02/26/2023	$65.19	$14.07	$18.36	$0.00	$97.62
	09/03/2023	$66.94	$14.07	$18.36	$0.00	$99.37
	03/03/2024	$68.74	$14.07	$18.36	$0.00	$101.17
	09/01/2024	$70.54	$14.07	$18.36	$0.00	$102.97
	03/02/2025	$72.34	$14.07	$18.36	$0.00	$104.77
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*
Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

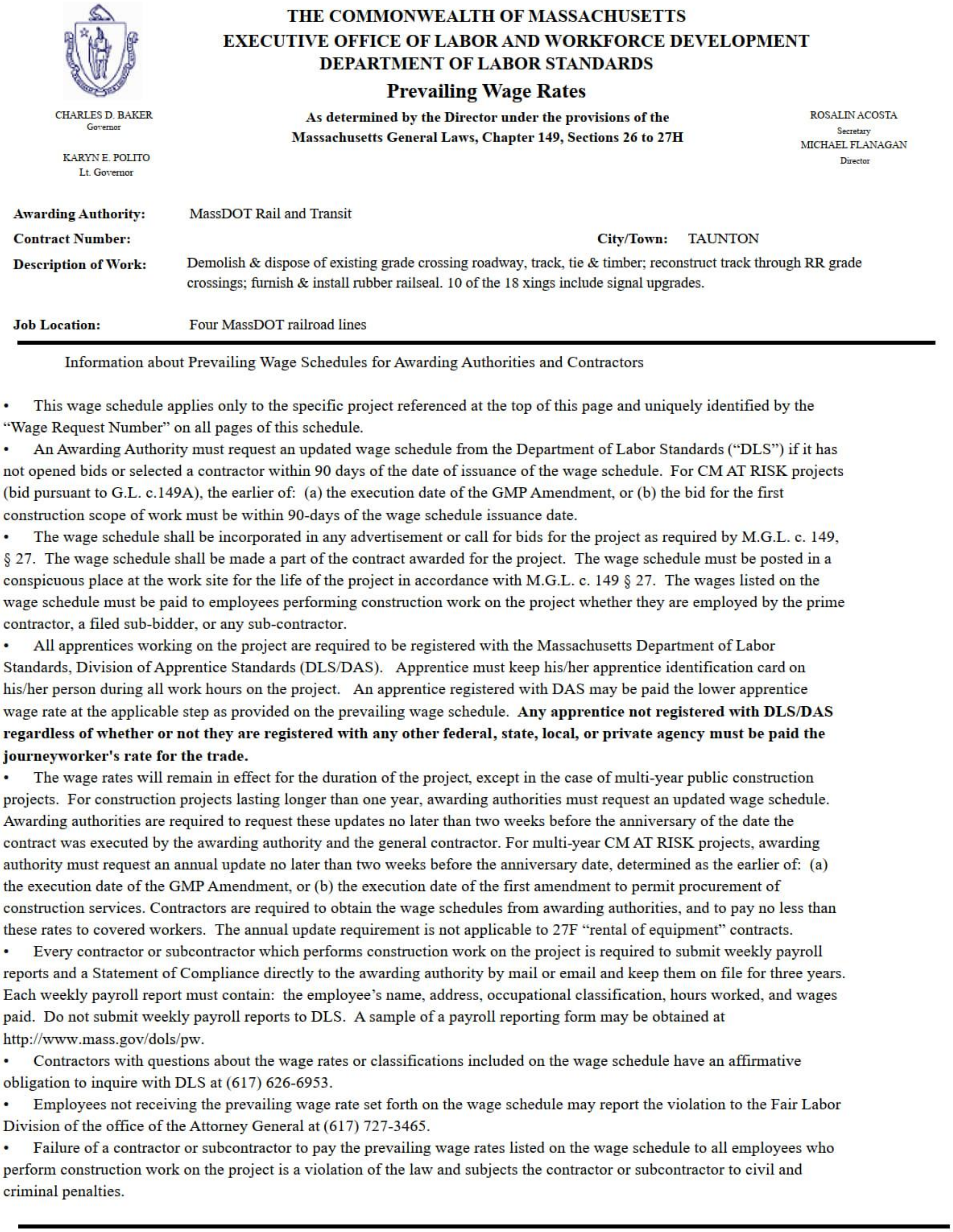
Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Rail and Transit

Contract Number:

City/Town: TAUNTON

Description of Work: Demolish & dispose of existing grade crossing roadway, track, tie & timber; reconstruct track through RR grade crossings; furnish & install rubber railseal. 10 of the 18 xings include signal upgrades.

Job Location: Four MassDOT railroad lines

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
For apprentice rates see "Apprentice- LABORER"	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
For apprentice rates see "Apprentice- LABORER"	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
For apprentice rates see "Apprentice- LABORER"	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (FOXBORO)*	02/01/2022	$55.01	$11.39	$21.65	$0.00	$88.05

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Foxboro*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.51	$11.39	$21.65	$0.00	$60.55
2	60	$33.01	$11.39	$21.65	$0.00	$66.05
3	70	$38.51	$11.39	$21.65	$0.00	$71.55
4	80	$44.01	$11.39	$21.65	$0.00	$77.05
5	90	$49.51	$11.39	$21.65	$0.00	$82.55

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.33	$9.10	$17.72	$0.00	$69.15
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2022	$44.53	$8.68	$19.97	$0.00	$73.18
	09/01/2022	$45.18	$8.68	$19.97	$0.00	$73.83
	03/01/2023	$45.78	$8.68	$19.97	$0.00	$74.43

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.27	$8.68	$1.73	$0.00	$32.68
2	60	$26.72	$8.68	$1.73	$0.00	$37.13
3	70	$31.17	$8.68	$14.78	$0.00	$54.63
4	75	$33.40	$8.68	$14.78	$0.00	$56.86
5	80	$35.62	$8.68	$16.51	$0.00	$60.81
6	80	$35.62	$8.68	$16.51	$0.00	$60.81
7	90	$40.08	$8.68	$18.24	$0.00	$67.00
8	90	$40.08	$8.68	$18.24	$0.00	$67.00

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.59	$8.68	$1.73	$0.00	$33.00
2	60	$27.11	$8.68	$1.73	$0.00	$37.52
3	70	$31.63	$8.68	$14.78	$0.00	$55.09
4	75	$33.89	$8.68	$14.78	$0.00	$57.35
5	80	$36.14	$8.68	$16.51	$0.00	$61.33
6	80	$36.14	$8.68	$16.51	$0.00	$61.33
7	90	$40.66	$8.68	$18.24	$0.00	$67.58
8	90	$40.66	$8.68	$18.24	$0.00	$67.58

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $30.45/ 3&4 $36.57/ 5&6 $56.36/ 7&8 $62.54

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17

All Aspects of New Wood Frame Work

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (FOXBORO)*	01/01/2020	$44.67	$12.75	$22.41	$0.62	$80.45

Apprentice - *CEMENT MASONRY/PLASTERING - Foxboro*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.34	$12.75	$15.41	$0.00	$50.50
2	60	$26.80	$12.75	$17.41	$0.62	$57.58
3	65	$29.04	$12.75	$18.41	$0.62	$60.82
4	70	$31.27	$12.75	$19.41	$0.62	$64.05
5	75	$33.50	$12.75	$20.41	$0.62	$67.28
6	80	$35.74	$12.75	$21.41	$0.62	$70.52
7	90	$40.20	$12.75	$22.41	$0.62	$75.98

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$52.38	$14.00	$16.05	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2021	$42.33	$9.10	$17.57	$0.00	$69.00
	06/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$42.08	$9.10	$17.57	$0.00	$68.75
	06/01/2022	$43.08	$9.10	$17.57	$0.00	$69.75
	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2021	$41.33	$9.10	$17.57	$0.00	$68.00
	06/01/2022	$42.33	$9.10	$17.57	$0.00	$69.00
	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 223*
Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.46	$10.90	$0.52	$0.00	$28.88
2	45	$19.65	$10.90	$0.59	$0.00	$31.14
3	50	$21.83	$10.90	$0.65	$0.00	$33.38
4	55	$24.01	$10.90	$6.28	$0.00	$41.19
5	60	$26.20	$10.90	$6.77	$0.00	$43.87
6	65	$28.38	$10.90	$7.24	$0.00	$46.52
7	70	$30.56	$10.90	$7.73	$0.00	$49.19
8	75	$32.75	$10.90	$8.21	$0.00	$51.86

Notes:

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*
Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4* For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$46.53	$13.75	$15.80	$0.00	$76.08
	05/01/2022	$47.86	$13.75	$15.80	$0.00	$77.41
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	11/01/2021	$48.06	$13.75	$15.80	$0.00	$77.61
	05/01/2022	$49.22	$13.75	$15.80	$0.00	$78.77
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2021	$23.16	$13.75	$15.80	$0.00	$52.71
	05/01/2022	$23.83	$13.75	$15.80	$0.00	$53.38

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- ELECTRICIAN"	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$41.76	$14.00	$16.05	$0.00	$71.81
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$24.50	$9.10	$16.64	$0.00	$50.24
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2022	$49.93	$8.68	$20.27	$0.00	$78.88

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.97	$8.68	$1.79	$0.00	$35.44
2	55	$27.46	$8.68	$1.79	$0.00	$37.93
3	60	$29.96	$8.68	$14.90	$0.00	$53.54
4	65	$32.45	$8.68	$14.90	$0.00	$56.03
5	70	$34.95	$8.68	$16.69	$0.00	$60.32
6	75	$37.45	$8.68	$16.69	$0.00	$62.82
7	80	$39.94	$8.68	$18.48	$0.00	$67.10
8	85	$42.44	$8.68	$18.48	$0.00	$69.60

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $32.94/ 3&4 $39.66/ 5&6 $60.32/ 7&8 $67.10

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 1333*	06/01/2020	$39.18	$10.80	$10.45	$0.00	$60.43

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**

Apprentice - *GLAZIER - Local 1333*
Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.59	$10.80	$1.80	$0.00	$32.19
2	56	$22.04	$10.80	$1.80	$0.00	$34.64
3	63	$24.49	$10.80	$2.45	$0.00	$37.74
4	69	$26.94	$10.80	$2.45	$0.00	$40.19
5	75	$29.39	$10.80	$3.15	$0.00	$43.34
6	81	$31.83	$10.80	$3.15	$0.00	$45.78
7	88	$34.28	$10.80	$10.45	$0.00	$55.53
8	94	$36.73	$10.80	$10.45	$0.00	$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43

Apprentice - *OPERATING ENGINEERS - Local 4*
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.26	$14.00	$0.00	$0.00	$42.26
2	60	$30.83	$14.00	$16.05	$0.00	$60.88
3	65	$33.40	$14.00	$16.05	$0.00	$63.45
4	70	$35.97	$14.00	$16.05	$0.00	$66.02
5	75	$38.54	$14.00	$16.05	$0.00	$68.59
6	80	$41.10	$14.00	$16.05	$0.00	$71.15
7	85	$43.67	$14.00	$16.05	$0.00	$73.72
8	90	$46.24	$14.00	$16.05	$0.00	$76.29

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A* For apprentice rates see "Apprentice- SHEET METAL WORKER"	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 223* For apprentice rates see "Apprentice- ELECTRICIAN"	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A* For apprentice rates see "Apprentice- SHEET METAL WORKER"	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
	06/01/2022	$37.06	$9.10	$16.64	$0.00	$62.80
	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.16	$9.10	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	09/01/2021	$46.50	$13.80	$17.14	$0.00	$77.44
	09/01/2022	$48.95	$13.80	$17.14	$0.00	$79.89

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Southern MA*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.25	$13.80	$12.42	$0.00	$49.47
2	60	$27.90	$13.80	$13.36	$0.00	$55.06
3	70	$32.55	$13.80	$14.31	$0.00	$60.66
4	80	$37.20	$13.80	$15.25	$0.00	$66.25

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.48	$13.80	$12.42	$0.00	$50.70
2	60	$29.37	$13.80	$13.36	$0.00	$56.53
3	70	$34.27	$13.80	$14.31	$0.00	$62.38
4	80	$39.16	$13.80	$15.25	$0.00	$68.21

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 37*	03/16/2021	$42.46	$7.70	$17.10	$0.00	$67.26

Apprentice - *IRONWORKER - Local 37*

Effective Date - 03/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	$29.72	$7.70	$17.10	$0.00	$54.52
2	75	$31.85	$7.70	$17.10	$0.00	$56.65
3	80	$33.97	$7.70	$17.10	$0.00	$58.77
4	85	$36.09	$7.70	$17.10	$0.00	$60.89
5	90	$38.21	$7.70	$17.10	$0.00	$63.01
6	95	$40.34	$7.70	$17.10	$0.00	$65.14

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Effective Date - 06/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.79	$9.10	$16.64	$0.00	$47.53
2	70	$25.42	$9.10	$16.64	$0.00	$51.16
3	80	$29.05	$9.10	$16.64	$0.00	$54.79
4	90	$32.68	$9.10	$16.64	$0.00	$58.42

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*
Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.25	$9.10	$16.64	$0.00	$46.99
2	70	$24.79	$9.10	$16.64	$0.00	$50.53
3	80	$28.33	$9.10	$16.64	$0.00	$54.07
4	90	$31.87	$9.10	$16.64	$0.00	$57.61

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.50	$9.10	$16.70	$0.00	$61.30
	06/01/2022	$36.40	$9.10	$16.70	$0.00	$62.20
	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
	06/01/2022	$36.31	$9.10	$16.64	$0.00	$62.05
	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$43.69	$11.39	$20.37	$0.00	$75.45

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.37	$0.00	$53.61
2	60	$26.21	$11.39	$20.37	$0.00	$57.97
3	70	$30.58	$11.39	$20.37	$0.00	$62.34
4	80	$34.95	$11.39	$20.37	$0.00	$66.71
5	90	$39.32	$11.39	$20.37	$0.00	$71.08

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$57.17	$11.39	$22.31	$0.00	$90.87

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.31	$0.00	$62.29
2	60	$34.30	$11.39	$22.31	$0.00	$68.00
3	70	$40.02	$11.39	$22.31	$0.00	$73.72
4	80	$45.74	$11.39	$22.31	$0.00	$79.44
5	90	$51.45	$11.39	$22.31	$0.00	$85.15

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/03/2022	$40.67	$8.58	$21.57	$0.00	$70.82
	01/02/2023	$41.92	$8.58	$21.57	$0.00	$72.07

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.37	$8.58	$5.72	$0.00	$36.67
2	65	$26.44	$8.58	$17.93	$0.00	$52.95
3	75	$30.50	$8.58	$18.98	$0.00	$58.06
4	85	$34.57	$8.58	$20.01	$0.00	$63.16

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.06	$8.58	$5.72	$0.00	$37.36
2	65	$27.25	$8.58	$17.93	$0.00	$53.76
3	75	$31.44	$8.58	$18.98	$0.00	$59.00
4	85	$35.63	$8.58	$20.01	$0.00	$64.22

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$23.48	$14.00	$16.05	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$28.44	$14.00	$16.05	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.43	$8.65	$0.00	$0.00	$36.08
2	55	$30.17	$8.65	$6.27	$0.00	$45.09
3	60	$32.92	$8.65	$6.84	$0.00	$48.41
4	65	$35.66	$8.65	$7.41	$0.00	$51.72
5	70	$38.40	$8.65	$19.63	$0.00	$66.68
6	75	$41.15	$8.65	$20.20	$0.00	$70.00
7	80	$43.89	$8.65	$20.77	$0.00	$73.31
8	90	$49.37	$8.65	$21.91	$0.00	$79.93

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$44.56	$8.65	$23.05	$0.00	$76.26
	07/01/2022	$45.76	$8.65	$23.05	$0.00	$77.46
	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.28	$8.65	$0.00	$0.00	$30.93
2	55	$24.51	$8.65	$6.27	$0.00	$39.43
3	60	$26.74	$8.65	$6.84	$0.00	$42.23
4	65	$28.96	$8.65	$7.41	$0.00	$45.02
5	70	$31.19	$8.65	$19.63	$0.00	$59.47
6	75	$33.42	$8.65	$20.20	$0.00	$62.27
7	80	$35.65	$8.65	$20.77	$0.00	$65.07
8	90	$40.10	$8.65	$21.91	$0.00	$70.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$8.65	$0.00	$0.00	$31.53
2	55	$25.17	$8.65	$6.27	$0.00	$40.09
3	60	$27.46	$8.65	$6.84	$0.00	$42.95
4	65	$29.74	$8.65	$7.41	$0.00	$45.80
5	70	$32.03	$8.65	$19.63	$0.00	$60.31
6	75	$34.32	$8.65	$20.20	$0.00	$63.17
7	80	$36.61	$8.65	$20.77	$0.00	$66.03
8	90	$41.18	$8.65	$21.91	$0.00	$71.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$42.62	$8.65	$23.05	$0.00	$74.32
	07/01/2022	$43.82	$8.65	$23.05	$0.00	$75.52
	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.31	$8.65	$0.00	$0.00	$29.96
2	55	$23.44	$8.65	$6.27	$0.00	$38.36
3	60	$25.57	$8.65	$6.84	$0.00	$41.06
4	65	$27.70	$8.65	$7.41	$0.00	$43.76
5	70	$29.83	$8.65	$19.63	$0.00	$58.11
6	75	$31.97	$8.65	$20.20	$0.00	$60.82
7	80	$34.10	$8.65	$20.77	$0.00	$63.52
8	90	$38.36	$8.65	$21.91	$0.00	$68.92

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$8.65	$0.00	$0.00	$30.56
2	55	$24.10	$8.65	$6.27	$0.00	$39.02
3	60	$26.29	$8.65	$6.84	$0.00	$41.78
4	65	$28.48	$8.65	$7.41	$0.00	$44.54
5	70	$30.67	$8.65	$19.63	$0.00	$58.95
6	75	$32.87	$8.65	$20.20	$0.00	$61.72
7	80	$35.06	$8.65	$20.77	$0.00	$64.48
8	90	$39.44	$8.65	$21.91	$0.00	$70.00

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$43.16	$8.65	$23.05	$0.00	$74.86
	07/01/2022	$44.36	$8.65	$23.05	$0.00	$76.06
	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$8.65	$0.00	$0.00	$30.23
2	55	$23.74	$8.65	$6.27	$0.00	$38.66
3	60	$25.90	$8.65	$6.84	$0.00	$41.39
4	65	$28.05	$8.65	$7.41	$0.00	$44.11
5	70	$30.21	$8.65	$19.63	$0.00	$58.49
6	75	$32.37	$8.65	$20.20	$0.00	$61.22
7	80	$34.53	$8.65	$20.77	$0.00	$63.95
8	90	$38.84	$8.65	$21.91	$0.00	$69.40

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.18	$8.65	$0.00	$0.00	$30.83
2	55	$24.40	$8.65	$6.27	$0.00	$39.32
3	60	$26.62	$8.65	$6.84	$0.00	$42.11
4	65	$28.83	$8.65	$7.41	$0.00	$44.89
5	70	$31.05	$8.65	$19.63	$0.00	$59.33
6	75	$33.27	$8.65	$20.20	$0.00	$62.12
7	80	$35.49	$8.65	$20.77	$0.00	$64.91
8	90	$39.92	$8.65	$21.91	$0.00	$70.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2022	$41.22	$8.65	$23.05	$0.00	$72.92
	07/01/2022	$42.42	$8.65	$23.05	$0.00	$74.12
	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.61	$8.65	$0.00	$0.00	$29.26
2	55	$22.67	$8.65	$6.27	$0.00	$37.59
3	60	$24.73	$8.65	$6.84	$0.00	$40.22
4	65	$26.79	$8.65	$7.41	$0.00	$42.85
5	70	$28.85	$8.65	$19.63	$0.00	$57.13
6	75	$30.92	$8.65	$20.20	$0.00	$59.77
7	80	$32.98	$8.65	$20.77	$0.00	$62.40
8	90	$37.10	$8.65	$21.91	$0.00	$67.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.21	$8.65	$0.00	$0.00	$29.86
2	55	$23.33	$8.65	$6.27	$0.00	$38.25
3	60	$25.45	$8.65	$6.84	$0.00	$40.94
4	65	$27.57	$8.65	$7.41	$0.00	$43.63
5	70	$29.69	$8.65	$19.63	$0.00	$57.97
6	75	$31.82	$8.65	$20.20	$0.00	$60.67
7	80	$33.94	$8.65	$20.77	$0.00	$63.36
8	90	$38.18	$8.65	$21.91	$0.00	$68.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.41	$9.10	$16.64	$0.00	$61.15
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*
Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$9.40	$23.12	$0.00	$57.06
2	60	$29.44	$9.40	$23.12	$0.00	$61.96
3	70	$34.35	$9.40	$23.12	$0.00	$66.87
4	75	$36.80	$9.40	$23.12	$0.00	$69.32
5	80	$39.26	$9.40	$23.12	$0.00	$71.78
6	80	$39.26	$9.40	$23.12	$0.00	$71.78
7	90	$44.16	$9.40	$23.12	$0.00	$76.68
8	90	$44.16	$9.40	$23.12	$0.00	$76.68

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $34.01/ 3&4 $41.46/ 5&6 $62.80/ 7&8 $69.25

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PLUMBER & PIPEFITTER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

Apprentice - *PLUMBER/PIPEFITTER - Local 51*
Effective Date - 08/30/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.60	$10.15	$2.50	$0.00	$31.25
2	50	$23.25	$10.15	$2.50	$0.00	$35.90
3	60	$27.89	$10.15	$8.80	$0.00	$46.84
4	70	$32.54	$10.15	$14.08	$0.00	$56.77
5	80	$37.19	$10.15	$17.60	$0.00	$64.94

Notes:

Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
	06/01/2022	$37.31	$9.10	$16.64	$0.00	$63.05
	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2021	$36.41	$9.10	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$33.69	$14.00	$16.05	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2022	$25.75	$9.76	$4.00	$0.00	$39.51
	12/01/2022	$26.40	$10.26	$4.75	$0.00	$41.41
	01/01/2023	$26.40	$10.26	$4.75	$0.00	$41.41
	12/01/2023	$27.00	$10.76	$5.45	$0.00	$43.21
	01/01/2024	$27.00	$10.76	$5.45	$0.00	$43.21
	12/01/2024	$27.60	$11.26	$6.15	$0.00	$45.01
	01/01/2025	$27.60	$11.26	$6.15	$0.00	$45.01
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2022	$47.03	$12.28	$19.45	$0.00	$78.76

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.52	$12.28	$5.21	$0.00	$41.01
2	60	$28.22	$12.28	$19.45	$0.00	$59.95
3	65	$30.57	$12.28	$19.45	$0.00	$62.30
4	75	$35.27	$12.28	$19.45	$0.00	$67.00
5	85	$39.98	$12.28	$19.45	$0.00	$71.71

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1

Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.

(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2022	$47.28	$12.28	$19.45	$0.00	$79.01

For apprentice rates see "Apprentice- ROOFER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2022	$53.70	$13.80	$25.60	$2.79	$95.89

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$22.55	$13.80	$6.01	$0.00	$42.36
2	42	$22.55	$13.80	$6.01	$0.00	$42.36
3	47	$25.24	$13.80	$11.26	$1.51	$51.81
4	47	$25.24	$13.80	$11.26	$1.51	$51.81
5	52	$27.92	$13.80	$12.23	$1.62	$55.57
6	52	$27.92	$13.80	$12.48	$1.63	$55.83
7	60	$32.22	$13.80	$13.87	$1.80	$61.69
8	65	$34.91	$13.80	$14.84	$1.91	$65.46
9	75	$40.28	$13.80	$16.77	$2.13	$72.98
10	85	$45.65	$13.80	$18.20	$2.33	$79.98

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2022	$64.36	$10.44	$22.10	$0.00	$96.90
	10/01/2022	$66.06	$10.44	$22.10	$0.00	$98.60
	03/01/2023	$67.76	$10.44	$22.10	$0.00	$100.30
	10/01/2023	$69.51	$10.44	$22.10	$0.00	$102.05
	03/01/2024	$71.31	$10.44	$22.10	$0.00	$103.85
	10/01/2024	$73.11	$10.44	$22.10	$0.00	$105.65
	03/01/2025	$74.91	$10.44	$22.10	$0.00	$107.45

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$22.53	$10.44	$12.35	$0.00	$45.32
2	40	$25.74	$10.44	$13.10	$0.00	$49.28
3	45	$28.96	$10.44	$13.85	$0.00	$53.25
4	50	$32.18	$10.44	$14.60	$0.00	$57.22
5	55	$35.40	$10.44	$15.35	$0.00	$61.19
6	60	$38.62	$10.44	$16.10	$0.00	$65.16
7	65	$41.83	$10.44	$16.85	$0.00	$69.12
8	70	$45.05	$10.44	$17.60	$0.00	$73.09
9	75	$48.27	$10.44	$18.35	$0.00	$77.06
10	80	$51.49	$10.44	$19.10	$0.00	$81.03

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$23.12	$10.44	$12.35	$0.00	$45.91
2	40	$26.42	$10.44	$13.10	$0.00	$49.96
3	45	$29.73	$10.44	$13.85	$0.00	$54.02
4	50	$33.03	$10.44	$14.60	$0.00	$58.07
5	55	$36.33	$10.44	$15.35	$0.00	$62.12
6	60	$39.64	$10.44	$16.10	$0.00	$66.18
7	65	$42.94	$10.44	$16.85	$0.00	$70.23
8	70	$46.24	$10.44	$17.60	$0.00	$74.28
9	75	$49.55	$10.44	$18.35	$0.00	$78.34
10	80	$52.85	$10.44	$19.10	$0.00	$82.39

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 223*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2022	$56.09	$11.39	$22.34	$0.00	$89.82

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.34	$0.00	$61.78
2	60	$33.65	$11.39	$22.34	$0.00	$67.38
3	70	$39.26	$11.39	$22.34	$0.00	$72.99
4	80	$44.87	$11.39	$22.34	$0.00	$78.60
5	90	$50.48	$11.39	$22.34	$0.00	$84.21

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$42.58	$9.10	$17.72	$0.00	$69.40
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.30	$9.10	$17.72	$0.00	$68.12
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$41.18	$9.10	$17.72	$0.00	$68.00
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$50.83	$14.00	$16.05	$0.00	$80.88
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$53.41	$9.10	$18.17	$0.00	$80.68
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$55.41	$9.10	$18.17	$0.00	$82.68

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$45.48	$9.10	$18.17	$0.00	$72.75
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)* For apprentice rates see "Apprentice- LABORER"	12/01/2021	$47.48	$9.10	$18.17	$0.00	$74.75
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
	06/01/2022	$36.56	$9.10	$16.64	$0.00	$62.30
	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	12/01/2021	$35.66	$9.10	$16.64	$0.00	$61.40
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	$51.38	$14.00	$16.05	$0.00	$81.43
WATER METER INSTALLER *PLUMBERS & PIPEFITTERS LOCAL 51* For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"	08/30/2021	$46.49	$10.15	$19.95	$0.00	$76.59
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

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On-Track Safety Manual

Roadway Worker Protection

Bridge Worker Safety

On-Track Maintenance Machines and Hyrail Vehicles

Mass Coastal Railroad

January 2018 Edition

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MASSACHUSETTS COASTAL RAILROAD, LLC

SAFETY STATEMENT

The On-Track Safety Program outlined in this manual contains Mass Coastal's interpretation of the minimum rules established by the Federal Railroad Administration in an effort to promote and ensure Roadway Worker Protection. The program requires the whole-hearted commitment of both the Mass Coastal management and its employees and contractors. Responsibilities fall to both the railroad and the individual. Safety of all employees, including roadway workers, is our primary concern at Mass Coastal Railroad.

This Program Manual is provided to each affected employee as required by FRA Regulations and is intended to be utilized for that purpose. The Program Manual remains the property of Massachusetts Coastal Railroad, LLC.

The Program Manual is adapted from the On-Track Safety Program developed by the American Short Line and regional Railroad Association, Updated April 2017.

The On-Track Safety Program is effective on January 6, 2008.

P. Christopher Podgurski

President

RAILROAD CONTACT PERSONS
RAILROAD PROFILE

RAILROAD INFORMATION:

Massachusetts Coastal Railroad, LLC
Operations Office
3065 Cranberry Highway
East Wareham, MA 02538
Telephone: 508-291-2116

Mass Coastal Railroad operates solely in the Commonwealth of Massachusetts.

RAILROAD CONTACT PERSONS for RWP:

Mark Renker	Manager Engineering, Track & Bridges	508-989-6856
Jamie Conlon	Mass Coastal Railroad Project Manager	508-441-8890

Network Operations Center (Dispatch) 608-352-6001 or (888) 783-4316

OPERATING AUTHORITIES IN EFFECT:

NORAC Operating Rules 11th Edition
Mass Coastal RWP Manual
Mass Coastal Timetable #7 and all related Bulletin or General Orders

ON-TRACK SAFETY (OTS) PROCEDURES IN EFFECT:

For Controlled Track:	For Non-Controlled Track:
Exclusive Track Occupancy	Inaccessible Track
Train Approach Warning (TAW)	Train Approach Warning (TAW)
Individual Train Detection (ITD)	Individual Train Detection (ITD)
Foul Time	

DEFINITIONS

Adjacent Track

A controlled or non-controlled track whose track center is spaced less than 25 feet from the track center of the occupied track

Competent Person

A person who is capable of identifying existing and predictable hazards in the workplace and who is authorized to take prompt corrective measures to eliminate them.

Controlled Tracks

Tracks upon which the rules require that all movements of trains must be authorized by a train dispatcher or a control operator/train dispatcher

Effective Securing Device

When used in relation to a manually operated switch or derail, one that is:

- Vandal resistant
- Tamper resistant
- Designed to be applied, secured, uniquely tagged and removed only by the class, craft or group of employees for whom protection is being provided.

Employee

An individual who is engaged or compensated by a railroad or by a contractor to perform any of the duties defined in this part.

Employer

A railroad or a contractor to a railroad, that directly engages or compensates individuals to perform any of the duties defined in this part.

Exclusive Track Occupancy (ETO)

A method of establishing working limits on controlled track.

Form D Control System (DCS)

A block system as defined by the NORAC Operating Rules, signaled or non-signaled, in which the movement of trains and or other mobile on rail equipment including hyrails and track cars operating outside of yard limits is authorized by Form D.

DCS in the context of Road Worker Protection is also used to authorize working limits established through “exclusive track occupancy”.

Foul Time

Method of establishing working limits on controlled track in which a roadway worker is notified by the train dispatcher or the control operator/train dispatcher that no trains will operate within a specific segment of controlled track until the roadway worker reports clear of the track.

Fouling

Placement of an individual or a piece of equipment in such proximity to a track that the individual or equipment could be struck by a moving train or on-track equipment, or in any case is within **4 feet** of the field side of the rail.

Hyrail Vehicle

A roadway maintenance machine that is manufactured to meet Federal Vehicle Motor Safety Standards and is equipped with retractable flanged wheels so that the vehicle may travel over the highway or on railroad tracks.

Inaccessible Track

Method of establishing working limits on non-controlled track by physically preventing entry and movement of trains and equipment.

Individual Train Detection (ITD)

Procedure by which **a Lone Worker** acquires On-Track Safety by seeing approaching trains and leaving the track before they arrive.

Interlocking Limits

The tracks between the opposing home signals of an interlocking

Lone Worker

An individual roadway worker who is not receiving On-track Safety by another roadway worker, who is not a member of a roadway work group and who is not engaged in a common task with another roadway worker.

Minor Correction

Minor correction means one or more repairs of a minor nature, including but not limited to, welding, spiking, anchoring, hand tamping, and joint bolt replacement that are accomplished with hand tools or handheld, hand supported or hand-guided power tools. The term does not include machine spiking, machine tamping, or any similarly distracting repair.

Non-Controlled Track

Track upon which trains are permitted by railroad rule or special instruction to move without receiving authorization from a train dispatcher or a control operator/train dispatcher. NORAC Rule 96 and 98.

NORAC (Northeast Operating Rules Advisory Committee)

Rules that govern the operation of the Mass Coastal Railroad

Occupied Track

Occupied track means a track on which on-track self-propelled equipment or coupled equipment is authorized or permitted to be located while engaged in a common task with a roadway work group with at least one of the roadway workers on the ground.

On-Track Roadway Maintenance Machine

A self-propelled, rail mounted, non-highway maintenance machine whose light weight is in excess of 7500 pounds, and whose purpose is not for the inspection of railroad track

On-Track Safety (OTS)

A state of freedom from the danger of being struck by a moving train or other railroad equipment, provided by operating or safety rules that govern track occupancy by personnel, trains and on-track equipment

Qualified Employee

A Mass Coastal Railroad employee who has successfully completed all required training, demonstrated proficiency in and been authorized to perform duties of a particular position or function.

Railroad Bridge

A structure that supports one or more railroad tracks above land or water and has a **span length of 10 feet or more**, as measured along the track centerline. The term **railroad bridge** applies to the entire structure between the faces of the back walls of abutments or equivalent components, regardless of the number of spans.

Railroad Bridge Worker or Bridge Worker

Any employee of a contractor and/or of a railroad owning or responsible for the construction, inspection, testing, or maintenance of a bridge whose assigned duties, if performed on a bridge. In general, any employee working on or about a bridge structure 12’ above ground or water is subject to the requirements of 214 sub Part B, section 214.105.

Restricted Speed

When required to move at restricted speed, movement must be made at a speed that allows stopping within half the range of vision short of train, engine, railroad car, men or equipment fouling the track, stop signal or derail or switch lined against movement. When a train or engine is required to move at restricted speed, the crew must keep a lookout for broken rail and not exceed 20 MPH.

Comply with these requirements until the leading wheels reach a point where movement at restricted speed is no longer required.

Roadway Machine

A machine used on or near the track for maintenance, repair, construction or inspection of track, bridges, roadway, signal and communications systems. Roadway Machines may be on-track, off-track or both. The machines include hi- rails, motor cars, Roadway Machines, work equipment and other forms of track cars.

Roadway Maintenance Work Train

A train which is being operated within working limits in conjunction with roadway maintenance, construction or repairs under the direction of a designated roadway worker

Roadway Worker in Charge (RWIC)/Employee in Charge (EIC)

A Mass Coastal Railroad qualified employee designated to provide On-Track Safety for one or more roadway work groups.

Roadway Work Group

Two or more roadway workers organized to work together on a common task.

Roadway Worker

Any employee of a railroad, or of a contractor to a railroad, whose duties include inspection, construction, maintenance or repair of railroad track, bridges, roadway, signal and communication systems, roadway facilities or roadway machines on or near the track or with the potential of fouling a track and flagmen and watchmen/lookouts as defined in this program.

Track

Term designating the area between rails and an area that extends to **4 feet** outside of each rail

Track Car

Equipment (other than trains) operated on track for inspection or maintenance

Track Center

Distance from the center of one track to the center of an adjacent track

Train

A locomotive with or without cars, with the rear piece of equipment displaying a marker

Train Approach Warning (TAW)

A method of establishing On-Track Safety by warning roadway workers of the approach of trains in ample time to move to, or remain in, a place of safety in accordance with requirements of FRA Roadway Worker Protection Rules

Watchman/Lookout

An employee who has been annually trained, qualified and designated to provide warning to roadway workers of approaching trains or on-track equipment.

Watchmen/Lookouts must be properly equipped to provide visual and auditory warning such as a whistle, air horn, white disk, red flag, lantern, or fusee. A Watchmen/Lookout sole duty is to look out for approaching trains, on-track equipment and provide at least *fifteen (15) seconds* advance warning to employees before arrival of trains and on-track equipment

Working Limits

A segment of track with definite boundaries upon which trains, engines and roadway machines may move only as authorized by the roadway worker designated as the RWIC/EIC

Work Zone

The area around a roadway machine that must not be entered without first communicating with the operator to establish safe work procedures.

1.0 ROADWAY WORKER PROTECTION ACT

1.1 Purpose of the Roadway Protection Act

The purpose of these rules is to define procedures to prevent roadway workers (both company and contractor employees) from being struck by railroad cars, locomotives, track units or other equipment while performing their duties. These rules have been prepared in accordance with Federal Railroad Administration Regulations found in 49 CFR, Part 214.

1.2 Training

1.2.1 All Roadway Workers

On-Track Safety training must be conducted ***ANNUALLY*** for all Roadway Workers.

Each Mass Coastal roadway worker is responsible for:

- Following the Rules governing on-track safety
- Staying clear of any track until the work activity requires fouling the track
- Determining that proper track protection is in fact being provided in accordance with this manual before fouling a track
- Making sure that a job briefing precedes any on-track work
- Wearing the proper Personal Protective Equipment required by Mass Coastal
  - Roadway Worker Employees and/or Contractors including:
    - Reflective Vest
    - Hardhat
    - Safety Glasses
    - Steel Toed Boots
    - Gloves
- All Roadway Workers must have the proper safety vest and their current RWP training card at all times while they are engaged in their RWP related duties.
- RWIC/EIC's and Roadway workers must have access to the On-Track Safety Manual at the work location.

1.2.2 Rules Qualified Employees

Employees whose duties include the inspection, construction, maintenance or repair of track, bridges, roadway, signals, and machinery or provides protection for other employees or themselves must be qualified on these rules and have access to these rules while on duty.

In addition to the training and qualification that all roadway workers receive, every roadway worker who is required to be Rules Qualified must also be trained and qualified annually as an **Employee-In-Charge (EIC) or Roadway Worker-In-Charge (RWIC)**. Employees required to provide protection for themselves or others must be Rules Qualified.

1.2.3 Contractors

Contractors to a railroad who perform work and/or foul of any track must be trained in the On-Track Safety procedures. This training can occur at the work site in the form of an extended job briefing containing applicable railroad on-track safety rules and all elements of 214.345.

Contractors to a railroad must not be allowed to foul a track unless:
- They have been properly trained in the On-Track Safety procedures, and/or
- A railroad employee who is trained and qualified as a lookout, flagman or RWIC/EIC is present at the work site.

1.3 Job Briefings

A Job Briefing _must_ be conducted _PRIOR_ to any roadway worker fouling any track. A Job Briefing is complete only when each roadway worker acknowledges understanding of the On-Track Safety procedures and instructions.

1.3.1 Job Briefing for Roadway Work Group

The RWIC/EIC must conduct a Job Briefing that includes all information related to On-Track Safety. This Job Briefing is given to every roadway worker ***PRIOR*** to fouling the track.

In addition to other safety issues, the *minimum* On-Track Safety information must include:
- Designated RWIC/EIC; name and telephone number
- Type of On-Track Safety provided
- A general plan and procedures the work will follow
- Additional briefings if on-track protection changes
- Track limits and time limits of track authority
- Track(s) that may be fouled
- Nature and characteristics of the work to be performed, to determine if adjacent track protection is necessary
- Information about any adjacent tracks, on-track safety on adjacent tracks if required or deemed necessary by the RWIC, and identification of any roadway maintenance machines that will foul such tracks.
- Procedure to arrange for On-Track Safety on other tracks, if necessary
- Method of warning when On-Track Safety is provided by a lookout

- Designated place of safety where workers clear for trains
- Designated work zones around machines
- Safe working/traveling distances between machines

Note: When working limits overlap, those roadway workers in charge of the respective working limits must determine who will be the sole RWIC/EIC of the overlapping limits.

The RWIC/EIC must give a follow-up Job Briefing whenever:

- Working conditions or procedures change
- Other workers enter the working limits
- On-Track Safety is changed or extended, or
- The main track has been cleared and On-Track Safety or track authority is to be released

1.3.2 Job Briefing for Lone Workers

A Lone Worker must participate in an On-Track Safety Job Briefing with his supervisor or other designated employee at the beginning of each tour of duty. This briefing must include:

- Planned itinerary, and
- On-Track Safety procedure to be used, and
- Completion of a Statement of On-Track Safety if Individual Train Detection per rule 1.4.3 is to be used.

Exception: **When communication has failed, On-Track Safety Job Briefing must be conducted as soon as possible after communication is restored.**

1.3.3 Contractor/Employee Responsibilities

- Acknowledge Job Briefing
- Be able to provide the following information
  - EIC name and cell phone number
  - Type of On Track Safety (OTS)
    - Form D if appropriate
    - Adjacent Track Protection if appropriate
    - Inaccessible Track Protection if appropriate

1.3.4 Communication Requirements

Each employee designated by the railroad to provide on-track safety for a roadway worker group or groups, must be equipped with a wireless communication devise capable of reaching the control center of the railroad. The employee must, where practicable, maintain immediate access to the communication device. When immediate access is not practicable, the employee in charge or lone worker must be equipped with a radio capable of monitoring transmissions from train movements in the vicinity.

1.4 On-Track Safety Procedures

The employee in charge of the roadway work group, or the Lone Worker, determines the type of On-Track Safety to be used. The type of On-Track Safety must comply with these provisions, as well as:

- NORAC Operating Rules
- Timetable
- General Orders
- Special Instructions

On-Track Safety can be provided for roadway workers by the following methods:

- Exclusive Track Occupancy
- Inaccessible Track
- Individual Train Detection (ITD)
- Train Approach Warning (TAW)
- Foul Time

1.4.1 Exclusive Track Occupancy

Exclusive Track Occupancy establishes working limits on **Controlled Tracks**.
Examples of Controlled Track include:

- Form D Control System Territory (DSC)
- Manual Interlocking
- Yard Limits (main line)

Exclusive Track Occupancy on **Controlled Track** can be established by the following four methods:

1. Exclusive Track Occupancy (NORAC Rule 133)
    a. Line 4 or 5
2. Train Approach Warning (TAW)
3. Individual Train Detection (ITD)
4. Foul Time (NORAC Rule 140)

Note: Trains and/or roadway maintenance machines must not enter the limits of the Form D unless verbally authorized by the RWIC/EIC. When so authorized, trains may move as specified by the RWIC/EIC. Restricted speed does apply unless higher speed is authorized by the RWIC/EIC not to exceed 30mph.

1.4.2 Inaccessible Track

Inaccessible Track is a method of establishing working limits on **non-controlled** tracks by making the track physically inaccessible to trains, engines, rolling equipment and on-track equipment.

Trains and roadway maintenance machines within working limits established by means of inaccessible track shall move only under the direction of the RWIC/EIC and must move prepared to stop within one half the range of vision, short of men and equipment. No operable locomotives or other items of on-track equipment except those under the direction of the RWIC/EIC may be located within these limits.

Non-controlled track consists of:

- Yard Tracks (not main line Yard Limits)
- Industrial Leads
- Non-controlled Sidings
- Rule 98 Tracks

The RWIC/EIC or Lone Worker establishes working limits using Inaccessible Track with one of the following methods:

- Line a switch or derail to prevent access to the working limits. Lock, spike and/or clamp switch or derail securely. A MOW lock must be used so train service employees cannot unlock it; or
- Place a portable derail(s) with red flag(s). Derails and red flags should be placed 300’ in advance of work area, if possible; or
- Place a flagman with instructions and the capability to hold all trains and equipment from entering the working limits; or
- Establish discontinuity in the rail to prevent movement into the working limits.

1.4.3 Individual Train Detection (ITD)

Individual Train Detection is a form of On-Track Safety that can be used ***only*** by Lone Workers. A Lone Worker has the right to use On-Track Safety procedures other than ITD if the Lone Worker feels the situation requires it. ITD can be used to provide On-Track Safety only if all the following conditions are met:

- The Lone Worker is trained, qualified, and designated to use ITD, and
- Only routine inspection or minor repair is being performed. The Lone Worker may not occupy any position or engage in any activity that would interfere with the ability to detect the approach of train or equipment in either direction, and
- The Lone Worker is not inside the limits of a Manual Interlocking, and
- The Lone Worker can visually detect the approach of trains or equipment moving at maximum speed and can move to a place of safety at least 15 seconds before its arrival.

NOTE: The place of safety must not be on a track unless working limits have been established on that track.

- No power operated tools or machines are in use within hearing range. The Lone Worker's ability to hear and see approaching trains and equipment is not impaired by:
  - Background noise
  - Lights
  - Inclement Weather
  - Passing Trains
  - Other Physical Conditions

- The Lone Worker has completed a written Statement of On-Track Safety. When using ITD, the Lone Worker must produce the completed Statement of On-Track Safety upon request.

1.4.4 Train Approach Warning (TAW)

Members of a roadway work group may foul a track without establishing working limits by using Train Approach Warning to **perform routine inspections or other minor corrections; or to provide warning on adjacent non-controlled tracks for large scale maintenance work.** The RWIC/EIC will establish On-Track Safety by designating one or more Lookouts to provide warning of all approaching movements. Lookouts will provide the warning using:

- A whistle or an air horn

And/or

- Any method agreed upon in Job Briefing

Train Approach Warning may be used to provide On-Track Safety only when all the following conditions are met:

- Each Lookout must be a qualified employee and equipped to provide Train Approach Warning, and
- A Lookout can give a Train Approach Warning in time to allow each roadway worker to move to a previously arranged place of safety at least 15 seconds before the arrival of a train, engine or other equipment, and
- Each roadway worker is in a position to receive a Train Approach Warning

Lookouts must devote their entire attention to detecting approaching trains and engines and warning the roadway workers. Lookouts must:

- Not be assigned other duties while functioning as a lookout.
- Remain at their duties until the RWIC/EIC either determines that protection is no longer necessary or sends another Lookout to relieve them.

Note: **The RWIC/EIC may provide Train Approach Warning by acting as the Lookout as long as the RWIC/EIC is not performing other duties.**

The Lookout's method of communicating a Train Approach Warning must be distinctive and clearly understood, regardless of noise or work distraction and regardless of the direction that the warned worker is looking and agreed upon during the Job Briefing.

The method that a Lookout will use to warn roadway workers will consist of:

- Blowing a whistle and/or sounding an air horn
- Verbal Communication
- Visual aid (ex. Paddle, flag, etc.)

Note: Touching a roadway worker can be utilized to replace the above aids when only two roadway workers are present. The two roadway workers must always remain within arm's length of each other when fouling the track.

The following chart identifies the minimum distance required for the maximum authorized speed **to provide employees the minimum 15 seconds necessary to clear the track prior to the arrival of a train or engine. Time requirements to distribute or receive warning, removing tool/materials, etc. must be added to the 15 seconds.**

Speed (Mph)	Distance (Ft)	Speed (Mph)	Distance (Ft)
5	110	35	770
10	220	40	880
15	330	45	990
20	440	50	1,100
25	550	55	1,210
30	660	60	1,320

1.4.5 Foul Time

Use Foul Time to establish working limits on **controlled track** in:

- DCS Territory
- Manual interlocking's

To establish working limits using Foul Time:

- Obtain Foul Time from the control operator/train dispatcher.
- Copy and repeat the Foul Time back to the control operator/train dispatcher.
- When protection is no longer required, report clear of the limits to the control operator/train dispatcher. The control operator/train dispatcher then releases the Foul Time.

1.4.6 Adjacent Track Protection on Non-Controlled Track

Inaccessible Track per rule 1.4.2 can be used to establish working limits when it is necessary to foul adjacent **non-controlled tracks**.

If working limits are not established on an adjacent non-controlled track, Train Approach Warning per rule 1.4.4 may be used to protect roadway workers fouling that track.

1.4.7 Adjacent Track Protection on Controlled Track

Protection for roadway workers and roadway work groups performing minor or major track maintenance with or without roadway maintenance machines will be established for adjacent controlled tracks within 25’ of ongoing work.

Note: The RWIC/EIC may establish protection on any adjacent track (s), even when not specifically required by this rule, at any time as deemed necessary by the RWIC/EIC to ensure the safety of the roadway work group

1.4.7.1 Occupying a Track with an Adjacent Controlled Track (s)

Exclusive track occupancy per rule 1.4.1 or train approach warning per rule 1.4.4 must be utilized to provide protection for roadway workers on an adjacent controlled track(s) (adjacent controlled track(s) spaced 25ft or less center to center).

NOTE: Train approach warning must not be utilized to provide protection on an adjacent controlled track if any component of the on track equipment such as a boom, arm or crane will foul the adjacent protected track. If any component of the equipment will foul the adjacent protected track, the RWIC/EIC must establish exclusive track occupancy per rule 1.4.1 for protection and not permit movements on the adjacent track. RWIC/EIC must not permit movements on the adjacent track until all men and equipment are clear.

1.4.7.2 Passing of Trains on Adjacent Controlled Tracks

When the RWIC/EIC permits the passing of trains or other on-track equipment on the controlled adjacent track(s), roadway workers must stop work and move to a pre-determined place of safety upon receiving a watchman/lookout warning, or notification that the RWIC/EIC intends to permit one or more trains or on track equipment movements within the working limits of the adjacent controlled track. The pre-determined place of safety must not be fouling any track unless working limits have been established for that track and no movements on that track within those limits are permitted by the RWIC/EIC. Machine operators must stop the operation of their equipment, and when practicable, persons using them must remove themselves to a pre-determined place of safety. Prior to authorizing movements through working limits on an adjacent track, the RWIC/EIC must notify roadways workers and receive verification that personnel and equipment are clear of the adjacent track(s).

1.5 Audible Warning from Trains

Trains must sound their locomotive whistle and ring their bell per the railroad operating rules when approaching roadway workers on or near the track, regardless of local whistle prohibitions.

To give trains advance notice of roadway workers on or near the track, each roadway worker fouling the track must wear company-approved work wear with reflectorized striping.

1.6 Operating and Working Near Roadway Machines

1.6.1 Purpose

The purpose of this section is to prevent accidents and casualties caused by the lawful operation of on-track roadway maintenance machines and hi-rail vehicles. This section prescribes minimum safety standards for on-track roadway maintenance machines and hi-rail vehicles.

1.6.2 On-Track Equipment Operator Training and Qualifications

1.6.2.1 General Training Requirements

No employee may operate a roadway machine without first:

- Having been trained in accordance with the rules;
- Having been informed of the safety procedures applicable to persons working near the machine; and
- Acknowledging full understanding of those safety procedures

1.6.2.2 Machine Specific Training Requirements

The operator's manual, which includes instructions for safe operation, shall be provided and maintained with each machine large enough to carry the document. A machine operator must have a clear understanding of the information contained in the associated manual prior to operating a roadway machine.

1.6.2.3 Qualifications

An employee will not be considered qualified to operate a unit of on-track equipment without having been trained to be competent in the operation of that machine. This training may be accomplished on-the-job through peer instruction or through a combination of classroom training and peer training.

1.6.3 Working with On-Track Equipment

When Working with On-Track Equipment, spacing guidelines must be adhered to in order to prevent contact between machines and to prevent machines from contacting workers. When work or travel conditions dictate that the machine spacing must be less than the guidelines require, the machine operators and the RWIC/EIC must have a thorough understanding of the specific task, the conditions under which the task is to be done and how the task is to proceed. In addition, the operator of a machine approaching workers who are to foul the track must communicate with the workers before getting closer than 15 feet to them.

Before a reverse move is made, the operator must ascertain that a backup alarm is activated and/or the appropriate horn or signal is provided. In addition, the operator must observe that the track is clear of men and machines before the reverse movement is made.

1.6.3.1 Work Zones around Machines

When roadway workers' tasks require that they occupy the center of the track, they must not enter a machine's Work Zone without first communicating with the operator to establish safe work procedures. Unless a different understanding is established through a job briefing, *this Work Zone extends from a point 15 feet in front of the machine to a point 15 feet behind the machine.*

1.6.3.2 Safe Working Distance between Machines

Unless a different understanding is established through a job briefing, the *minimum distance between machines while working is 40 feet.*

1.6.3.3 Safe Traveling Distance between Machines

On-track equipment must maintain a *minimum distance of 200 feet* between each other, except when traveling through a crossing, In addition to the 200 feet, on-track equipment must operate at a speed which will allow stopping within half the range of vision.

Note: Adverse weather and/or rail conditions may require greater separation distances.

1.6.3.4 Stopping On-Track Equipment

When necessary to slow or stop on-track equipment during travel, the operator must signal following equipment operators either by radio or hand signal and be understood.

1.6.3.5 Tying Up Equipment

All equipment must be properly secured by the following procedures when left unattended to ensure safety:

- Secure all brakes, booms, locks, and hooks.
- Dismount the machine on the field side of the track, away from live traffic.

EXCEPTION: If the track is between live tracks, dismount on the side designated in the job briefing

1.7 Right to Challenge On-Track Safety

The railroad and each roadway worker share joint responsibility for ensuring that On-Track Safety is provided.

1.7.1 Responsibilities of the Railroad

The Railroad must:

- Provide proper training of every roadway worker as outlined in 1.2.
- Guarantee each employee and/or operator the absolute right to challenge, in good faith, whether the On-Track Safety procedures to be applied at the job site comply with the Railroad Rules. Each employee has the right to remain clear of the track until the challenge is resolved.
- Follow the procedures outlined in 1.7.3 to resolve challenges promptly and equitably.

1.7.2 Responsibilities of the Roadway Worker

Each roadway worker has the following responsibilities:

- Follow the Railroad’s On-Track Safety procedures.
- Avoid fouling a track except when necessary to perform your duties.
- Before fouling a track, determine that On-Track Safety is being provided.

Note: A roadway worker or roadway machine is considered to be fouling a track when within 4 feet of the nearest rail.

- Refuse any directive to violate an On-Track Safety or machine/hyrail rule and promptly notify a supervisor when the safety provisions to be applied at the job site do not comply with the railroad rules.

1.7.3 Good Faith Challenges and Resolution of Those Challenges

A roadway worker may make a Good Faith Challenge to on-track safety procedures and conditions of roadway maintenance machines and hyrail vehicles. Follow these steps when resolving a challenge:

1. The roadway worker informs the RWIC/EIC that he or she does not believe that the procedure and/or condition complies with the railroad's rules.

   Note: Employees may not be subject to any retribution or punishment for making a good faith challenge.

2. The RWIC/EIC will review procedure and/or condition with the employee to verify that the procedure and/or condition complies with the railroad's rules.
3. If the employee is still not satisfied that the procedure or condition complies with the railroad's rules, the RWIC/EIC will contact the Manager of Engineering, Track & Bridges and complete the "Good Faith Challenge Form."
4. Upon the review:
   - If the Manager determines that the procedure and/or condition is not in compliance with the railroad rules, the RWIC/EIC will correct procedure and/or condition to ensure compliance.
   - If the Manager of Engineering, Track & Bridges determines that procedure and/or condition is in compliance with the railroad rules, the challenging employee must perform the assigned task.

2.0 Bridge Worker Safety

2.1 General Requirements

2.1.1 General Fall Protection Requirements

When working on a railroad bridge at a height of **12 feet** or more above the ground or creek bed, use personal fall arrest equipment. If fall protection is required to perform bridge repairs and proper equipment is not available for a rescue plan, the supervisor should be contacted prior to making repairs.

Note: If rescue equipment is unavailable, the work cannot be attempted until equipment is available and all involved workers are properly trained.

Where there is no deck openings through which an employee can fall, the use of personal fall arrest equipment is not required when:

- Walking within the gage of the rails.
- Performing minor inspections or repairs exclusively between the outside rails.
- Working on a bridge that has walkways or railings that meet the requirements of the American Railway Engineering & Maintenance of Way Association Manual for Railway Engineering.
- Conducting bridge inspections when:
  - A written program in place that requires training in, adherence to, and use of safe procedures associated with climbing techniques and procedures to be used
  - The inspector has been trained and qualified according to that program
  - The inspector has been previously and voluntarily designated to perform inspection under the provisions of that program and has accepted the designation
  - The inspector is familiar with the appropriate climbing techniques associated with bridge structures
  - The inspector is engaged solely in moving on or about the bridge or observing, measuring and recording the dimensions and condition of the bridge
  - The inspector is provided all equipment necessary to meet the needs of safety, including any specialized alternative systems required
  - The installation or use of fall arrest equipment poses a greater exposure to risk than the work to be performed

Note: Minor repairs include, but are not limited to, routine welding, spiking, anchoring, spot surfacing and joint bolt replacement. Replacing bridge ties or rail is *NOT* considered minor repairs.

2.1.2 Fall Protection System Standards

Fall protections systems utilized must be compliant with *49CFR Part 214.105.*

Note: Body belts shall not be utilized.

2.2 Safety Net Systems

Safety net systems must be compliant with *49CFR Part 214.105*.

2.3 Working Over or Adjacent to Water

When working over or adjacent to water 4' feet or greater in depth or where the potential of drowning exists utilize a:

- Personal fall protection system. (Fall protection is require if 12 or more feet above the water.) or life vest
- Ring buoy with a minimum of 90 feet of line and no more than 200 feet between buoys; and inflatable boat, manned if necessary.

2.4 Inspecting Equipment and System

- Prior to use, Inspect fall protection equipment and systems according to the manufacturers' instructions and as reviewed in training sessions.
- A fall protection system or component involved in a fall shall be immediately and permanently removed from service until fully inspected and determined by a competent person to be undamaged and suitable for reuse.

2.5 Cleaning and Storing Equipment

- Clean fall protection equipment components according to the manufacturers' instructions provided with the equipment, and as reviewed in training sessions.
- Store fall protection equipment components where they cannot be accessed by unauthorized personnel. Protect from adverse weather conditions, chemical exposure and open flames and sparks.

2.6 Scaffolding

Scaffolding systems utilized must be compliant with 49CFR Part 214.109.

2.7 Bridge Worker Rescue Plan

Prior to utilizing fall protection equipment, a job briefing should be conducted to identify and prepare for implementation of emergency rescue needs.

2.8 Personal Protective Equipment (PPE) for Bridge Workers

- Hard hats, conforming to the ANSI standards, must be utilized by bridge workers when on or under a bridge.
- Steel-toed boots, conforming to the ASTM standards, must be utilized by bridge workers when on or under a bridge.
- Safety glasses, conforming to ANSI standards, must be utilized by bridge workers when on or under a bridge.
- Face shield should be utilized when safety glasses will not provide adequate protection.
- All PPE will be kept clean and in good repair with no structural or optical damage.

Hard hats, face shields, non-prescription safety glasses and googles (cover-all type for workers wearing prescription glasses) shall be provided to the bridge workers.

3.0 ON-TRACK MAINTENANCE MACHINES AND HI-RAIL VEHICLES

3.1 General Prestart Checks

Prior to starting work equipment, check the following levels:

- Engine oil
- Radiator coolant
- Transmission fluid
- Hydraulic fluid
- Hydraulic brake fluid
- Fuel
- Other parts that use any type of fluid

3.2 Equipment Inspection and Condition

- Machine Operators must maintain work equipment in a safe condition
- Machine Operators should have the necessary tools to perform daily maintenance and basic repairs
- Machine Operators must inspect work equipment before and periodically during use
- Any non-compliant FRA condition must be red tagged, dated and reported to the Supervisor.

  Non-compliant conditions are as follows:
    - Headlights/work light: Machine can be operated for 7 days during daylight hours
    - Horn: Portable horn can be utilized for 7 days
    - Fire extinguisher: Portable fire extinguisher can be utilized for 7 days
    - Back-up alarm/strobe light: Must be repaired within 7 days
    - Operator’s seat: Must be repaired within 24 hours
    - Braking system: Move machine to clearance point and place out of service if unable to couple to other machine to provide braking or no secondary braking system.

3.2.1 Repairs

- If parts are available, repairs must be completed immediately. If repairs cannot be made immediately, contact Supervisor
- If parts have been ordered within 24 hours of defect notification (excluding brake system and operator seat failure), the machine can be operated for 30 days
- Repairs must be made within the 30 days
- If equipment is not repaired after 30 days, it must be removed from service

3.2.2 Towing

- Must be equipped with towing bar or coupler
- Must not exceed braking system capabilities

3.3 On-Track Roadway Maintenance Machine Safety Requirements (General)

- Secure position (e.g., handhold, handrails, or seat) for each operator and transported roadway worker
- Rider position must be clearly identified
- Functional horn with triggering device easily identifiable and within reach of operator
- Headlights capable of lighting 300ft ahead of equipment
- Overhead covers at the operator(s) position if previously equipped
- Floors, decks stairs, and ladders must provide secure access and free of obstructions, grease and oil
- Flagging kit, if operated alone or lead/trailing machine in gang
- Operator’s manual

3.4 On-Track Roadway Maintenance Machines Safety Requirements (Built on or after January 1, 1991)

In addition to the general requirements the following also apply:

- Back-up alarm or rearward viewing mirror if feasible
- Operative heater when operated below 50 degrees or equipped or has been equipped by manufacturer
- Light weight of machine clearly displayed, if more than 7,500 pounds
- Reflective material/device or operable brake lights
- Safety glass
- Turntable lock or warning light

3.5New On-Track Roadway Maintenance Machine Safety Requirements (Built after September 27, 2004)

In addition to the general requirements the following also apply:

- Tampers, regulators, mechanical brooms, rotary scarifiers, undercutters or mechanical equivalent must have operational heater, AC and pressurized ventilation system.
- Operator’s seat, unless designed to travel by standing, then equipped with handholds or handrails to a safe and secure position
- Locking turntable (e.g., hooks latches, pins, etc.)
- Windshield with safety glass if designed with windshield. Power windshield wipers or suitable equivalent if wipers or incompatible with windshield
- Capable braking system

- First-aid kit
- Fire extinguisher (5BC rating or higher)
- Display as-built light weight in a conspicuous location
- Headlights capable of lighting 300ft ahead of equipment
- Work lights if operated at night, unless equivalent light is provided
- Operational 360-degree strobe light, unless designed without roof and light weight is less than 17,500
- Brake light activated by application of braking system and visible at 300ft
- Functional horn with triggering device clearly identifiable
- Back-up alarm with review mirror
- Speed indicator, if light weight exceed 32,500 pounds and is operated at speeds in excess of 20 mph

3.6Hi-rail Safety Inspection Checklist

Tram, wheel wear and gage must be inspected annually with no more than 14 months between inspections. Inspection must be documented and retained by Supervisor unit next required annual inspection. Prior to use, the operator must ensure the following:

- The annual inspection is current.
- Any non-compliant FRA condition must be red tagged and reported to your Supervisor.

  Non-compliant conditions are as follows:
    - Functional strobe light
    - Back-up Alarm
    - Flagging kit

3.6.1 Repairs

- If parts are available, repairs must be completed immediately. If repairs cannot be made immediately, contact Supervisor
- If parts have been ordered within 24 hours of defect notification (excluding brake system and operator seat failure), the hi-rail can be operated for 30 days
- Repairs must be made within the 30 days.
- If equipment is not repaired after 30 days, it must be removed from service

Appendix A

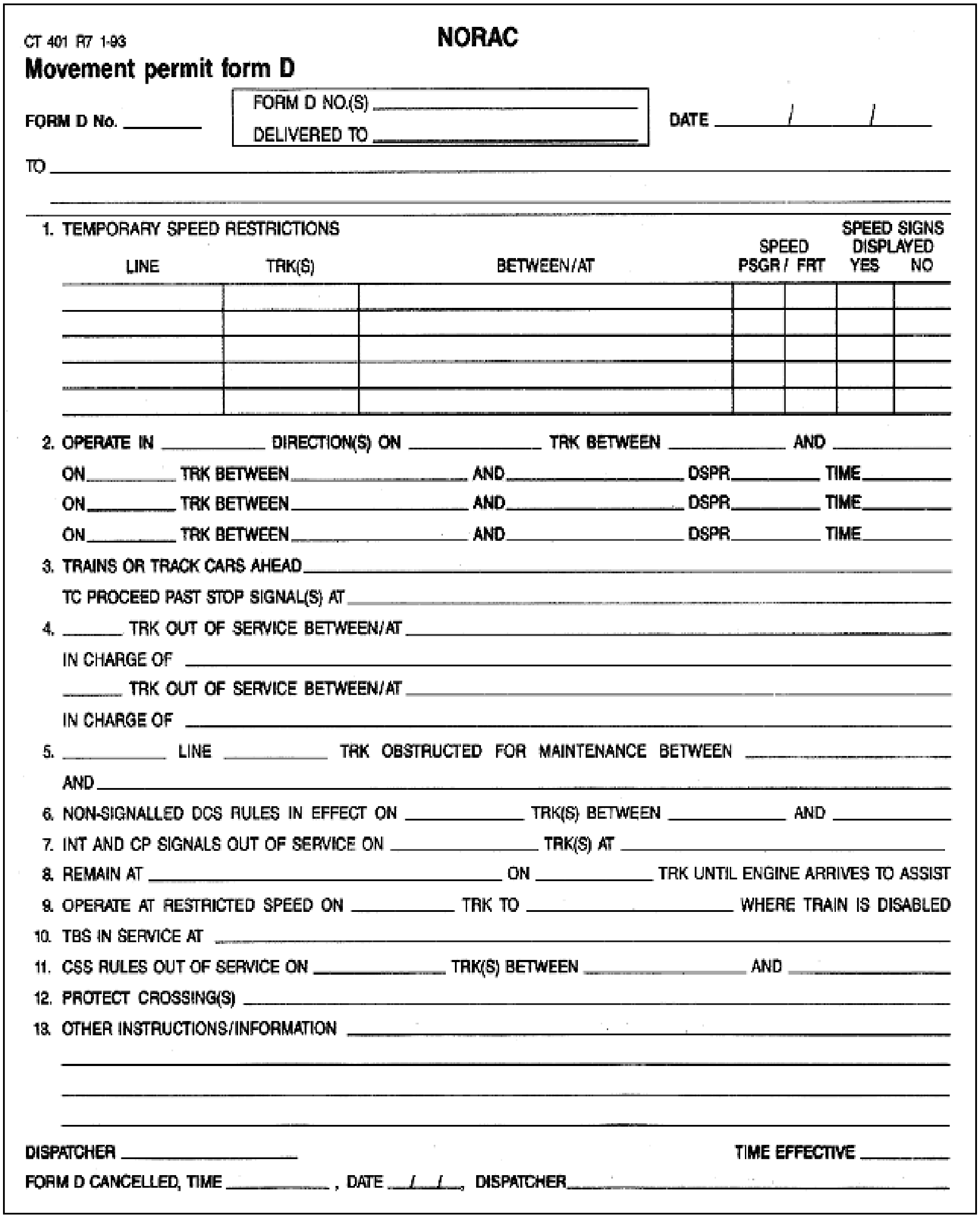
SAFETY TIPS FOR ROADWAY WORKERS

1. Never foul a track unless your work requires you to do so.
2. Never foul a track until you are absolutely certain that on-track safety has been established and that the OTS is appropriate for the work to be performed.
3. You have the right to challenge the on-track safety procedures to be applied at the job location if you believe that they do not comply with the rules of the railroad. You should remain clear of the track until the challenge is resolved.
4. An on-track safety job briefing must be conducted before fouling the track, and you should understand all aspects of your on-track safety to ensure that you are adequately protected. You must acknowledge that you understand the briefing and the on-track safety must be appropriate for the work that you are performing.
5. Remind the person providing you the on-track safety job briefing that you must be notified of any changes that may occur throughout the day.
6. You must know the identity and cell phone number of the EIC.
7. It is critical to know the type of on-track safety for all of the track(s) you are to foul.
8. When train approach warning is to be provided, the designated place of safety must be known and established in the job briefing. It is imperative that you are able to be clear of the track before any train is not less than 15 seconds from your work location.
9. If the work activity is on a track with adjacent track(s), you must know what type of on-track safety is provided on those adjacent track(s).

10. If you are a lone worker using individual train detection:
    a. The on-track safety statement must be completed. (continued on next page)
    b. You have the right to use an alternative form of on-track safety other than individual train detection.
    c. You cannot be working where there is noise (e.g., environmental, power tools, machines, etc.) or other impairments interfering with your ability to detect approaching trains.
    d. You must be outside a manual interlocking, controlled point, or remote hump yard facility.
    e. You must have the ability to clear to a protected area.
    f. The required sight distance must be available in order for you to be in the clear before any train is not less than 15 seconds away from your work location.
    g. Only minor repairs, inspection, or correction work may be performed as long as they do not interfere with your ability to detect approaching trains.
11. If the task involves Roadway Maintenance Machines (RMM), you must know the RMM procedures to ensure your safety.
12. Before fouling any track be sure to be wearing the proper high-visibility clothing/PPE.
13. The specific Working Limits boundaries must be clearly defined by mile posts and/or other physical characteristics such as stations found in the time table.
14. **Stop, look, and listen before crossing any track, regardless of the on-track safety status of the track(s).**

You can expect the movement of trains, engines, cars, or other moveable equipment at any time, on any track, in either direction.

Appendix B



CT 401 R7 1-93

NORAC

Movement permit form D

FORM D No. ________

FORM D NO.(S) ________

DELIVERED TO ________

DATE ____/____/____

TO ________

1. TEMPORARY SPEED RESTRICTIONS

LINE	TRK(S)	BETWEEN/AT	SPEED PSGR /	SPEED FRT	SPEED SIGNS DISPLAYED YES	SPEED SIGNS DISPLAYED NO

2. OPERATE IN ________ DIRECTION(S) ON ________ TRK BETWEEN ________ AND ________

ON ________ TRK BETWEEN ________ AND ________ DSPR ________ TIME ________

ON ________ TRK BETWEEN ________ AND ________ DSPR ________ TIME ________

ON ________ TRK BETWEEN ________ AND ________ DSPR ________ TIME ________

3. TRAINS OR TRACK CARS AHEAD ________

TC PROCEED PAST STOP SIGNAL(S) AT ________

4. ________ TRK OUT OF SERVICE BETWEEN/AT ________

IN CHARGE OF ________

________ TRK OUT OF SERVICE BETWEEN/AT ________

IN CHARGE OF ________

5. ________ LINE ________ TRK OBSTRUCTED FOR MAINTENANCE BETWEEN ________

AND ________

6. NON-SIGNALLED DCS RULES IN EFFECT ON ________ TRK(S) BETWEEN ________ AND ________

7. INT AND CP SIGNALS OUT OF SERVICE ON ________ TRK(S) AT ________

8. REMAIN AT ________ ON ________ TRK UNTIL ENGINE ARRIVES TO ASSIST

9. OPERATE AT RESTRICTED SPEED ON ________ TRK TO ________ WHERE TRAIN IS DISABLED

10. TBS IN SERVICE AT ________

11. CSS RULES OUT OF SERVICE ON ________ TRK(S) BETWEEN ________ AND ________

12. PROTECT CROSSING(S) ________

13. OTHER INSTRUCTIONS/INFORMATION ________

DISPATCHER ________

TIME EFFECTIVE ________

FORM D CANCELLED, TIME ________ , DATE ___/___/___, DISPATCHER ________

Appendix C

Massachusetts Coastal Railroad

GOOD FAITH CHALLENGE FORM

Name: ____

Job Position: ____

Job Location: ____

Supervisor's Name: ___________________________ Supervisor's Title: ________________

Date and Time of Occurrence: ____

Work Location: ____

Track and Mile Post: ____

Nearest City/Town: ____

On-Track Safety Procedure applied (or lacking) at working location:

____

____

____

Railroad Safety or Operating Rule not being complied with:

____

____

____

Reason for this Challenge:

____

____

____

Other Employees with information regarding this situation:

____

____

____

Signature: ____ Date: ___________________

Determination by Supervisor:

____

____

____

Supervisor Signature: ____ Date: _____________________

INSTRUCTIONS: The employee making challenge shall complete this form, sign and date it, and give it to his Supervisor who shall document his determination, sign and forward to the Roadmaster.

Appendix D

Railroad Matrix

The following Matrix will assist the Railroad Supervisor, or the RWIC/EIC and any Roadway Worker responsible for establishing working limits in the determination of On-Track Safety Protection. To determine the protection available, the RWIC/EIC or Lone Worker decides what track is to be occupied and the appropriate type of protection to be used.

TYPE OF ON-TRACK SAFETY (OTS)	**NORAC**	**CONTROLLED TRACK**		**NON-CONTROLLED TRACK**		**MANUAL INTERLOCK OR CP**	
		GANG	**LONE**	**GANG**	**LONE**	**GANG**	**LONE**
EXCLUSIVE TRACK OCCUPANCY (ETO) (1)	Rule 133	•	•			•	•
FOUL TIME (1)	Rule 140	•	•			•	•
INACCESSIBLE TRACK (1)	Rule 141			•	•		
TRAIN APPROACH WARNING (TAW)		•		•			
INDIVIDUAL TRAIN DETECTION (ITD)			•		•		

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GENERAL ORDER B-9

EFFECTIVE 12:01 A.M., OCTOBER 12, 2021

General Orders In Effect In This Series: B-1, B-5, B-6, B-7, B-8 and B-9.

++

SUBJECT: ADDITIONS/AMENDMENTS TO THE ON-TRACK SAFETY MANUAL

Changes that are new to this general order are underlined.

Make the following changes to Massachusetts Coastal Railroad On-Track Safety Manual dated January 1, 2018:

On Page 13, in order to remove Train Approach Warning (TAW) and Individual Train Detection (ITD) from the list of methods of Exclusive Track Occupancy, **1.4.1 Exclusive Track Occupancy** is replaced with the following:

1.4.1 Exclusive Track Occupancy

Exclusive Track Occupancy establishes working limits on **Controlled Tracks**.
Examples of Controlled Track include:

- Form D Control System Territory (DCS)
- Manual Interlocking
- Yard Limits - Main Track Only

Exclusive Track Occupancy on Controlled Track may be established by the following methods:

- NORAC Rule 133 – Form D Line 4 or 5
- NORAC Rule 140 – Foul Time
- NORAC Rule 93 – Yard Limits – Applies only to the Main Track, and only when the dispatcher providing the required permission provides it exclusively to the Roadway Worker In Charge.

Note: Trains and/or roadway maintenance machines must not enter the limits of the Form D unless verbally authorized by the RWIC. When verbally authorized by the RWIC to enter the limits, trains must move at Restricted Speed, unless otherwise authorized by the RWIC. The RWIC must not authorize any speed greater than 20 MPH.

Permission must be given in the following manner:
“Extra 453 (or TC 1234) may proceed North through my out-of-service limits at (**Restricted or Normal**) speed, not exceeding (**a speed no greater than 20**) MPH from A to B.”

On Page 15, in order to detail the warning method used by a Watchman/Lookout, the first paragraph of **1.4.4 Train Approach Warning (TAW)** is replaced with the following:

1.4.4 Train Approach Warning (TAW)

Members of a roadway work group may foul a track without establishing working limits by using Train Approach Warning to perform routine inspections or other minor corrections; or to provide warning on adjacent non-controlled tracks for large scale maintenance work. The RWIC will establish On-Track Safety (OTS) by designating one or more lookouts to provide warning of all approaching movements. Warning will be provided by one or more Lookouts using any of the following methods:

- Audible Notification, using a whistle or compressed air horn. A Visual Notification using a Red/Orange flag may be used in conjunction with an audible warning, but a visual notification must not be the sole method of notification.
- Physical Touch, when for a single roadway worker within arm's length away from the Watchman/Lookout

(The remainder of **1.4.4 Train Approach Warning (TAW)** remains unchanged.)

On Page 19, in order to correct terminology and provide additional detail, **1.6.3 Working with On-Track Equipment** is replaced with the following:

1.6.3 Working with Roadway Maintenance Machines

When working with Roadway Maintenance Machines, spacing guidelines must be adhered to in order to prevent contact between machines and to prevent machines from contacting workers. When work or travel conditions dictate that the machine spacing must be less than the guidelines require, the machine operators and the RWIC must have a thorough understanding of the specific task, the conditions under which the task is to be done and how the task is to proceed. In addition, the operator of a machine approaching workers who are to foul the track must communicate with the workers before getting closer than 15 feet to them. When the task of a roadway worker requires the roadway worker to occupy the Work Zone of a Roadway Maintenance Machine, the roadway worker must not enter the Work Zone without first communicating with the operator of the Roadway Maintenance Machine. This Work Zone extends from a point 15 feet around the entire machine, which includes extendable attachments and material handled.

Before a reverse move is made, the operator must ascertain that a backup alarm is activated and/or the appropriate horn or signal is provided. In addition, the operator must observe that the track is clear of men and machines before the reverse movement is made.

1.6.3.1 Work Zones around Roadway Maintenance Machines

If a roadway worker needs to enter an operator's Work Zone, the following procedures must be accomplished:

1. The RMM operator and the roadway worker(s) must establish eye contact,
2. The RMM operator must receive verbal communication from the roadway worker(s) stating that the roadway worker(s) wish to enter the Work Zone,
3. The RMM operator must notify the roadway worker(s) when it is safe to enter the Work Zone and roadway worker(s) must not enter until it is safe to do so,
4. The RMM operator must stop all movement of the equipment and place the RMM in neutral, and
5. When safe to do so, the RMM operator must remove and raise hands from controls of the RMM.

When work must occur within the RMM operators work zone, after following steps 1-5 above, roadway workers must also follow these procedures:

1. The RMM operator and roadway worker must verbally communicate the expected movement(s) and
2. If the RMM operator loses sight of the roadway worker, RMM operation and movement must immediately stop, and must not resume until sight is re-established.
3. If roadway worker on the ground is providing movement signals, the signals should be clearly understood by both parties, and the operator must not act on those signals until it is safe to do so.

1.6.3.2 Safe Working Distance Between Roadway Maintenance Machines

Unless a different understanding is established through a job briefing, the minimum distance between machines while working is 40 feet.

1.6.3.3 Safe Traveling Distance Between Roadway Maintenance Machines

On-track equipment must maintain a minimum distance of 200 feet between each other, except when traveling through a crossing, in addition to the 200 feet, on-track equipment must operate at a speed that will allow stopping within half the range of vision.

Note: Adverse weather and/or rail conditions may require greater separation distances.

1.6.3.4 Stopping On-Track Equipment

When necessary to slow or stop on-track equipment during travel, the operator must signal following equipment operators either by radio or hand signals. If a radio is used, the machine operator transmitting must be assured that the following equipment operators have received and understood the message transmitted. If hand signals are used, the signal must be continuous until it is verified that the following equipment operators have observed and understood the movement is to be slowed or stopped.

If machines are to be “bunched” when stopped, all employees must remain clear of the track until the entire movement has stopped unless otherwise instructed by the RWIC. After stopping, the lead machine operator in the movement will dismount that machine and assume a position that is visible to the following machine operator as well as to anyone who could step into the path of the next approaching machine. The dismounted operator will spot the following machine using hand signals. This procedure will be used by each successive operator in the movement to spot the following machine.

Note: All equipment must be properly secured when left unattended.

1.6.3.5 Tying Up Equipment

Follow these procedures to ensure safety:

1. Secure all brakes, booms, locks, and hooks.
2. Dismount the machine on the field side of the track, away from live traffic.
   EXCEPTION: If the track is between live tracks, dismount on the side designated in the job briefing.
3. Stand beside the machine and direct the next roadway machine to a stop.
4. Do not go between machines until all machines have come to a stop or the RWIC has given permission.

Be Governed Accordingly.

Mark Renker, Vice President of Engineering

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MassDOT MW-1

RECOMMENDED PRACTICE

FOR THE

MAINTENANCE OF TRACK AND SPECIAL TRACKWORK

Massachusetts Department of Transportation
10 Park Plaza, Suite 4160
Boston, MA 02116

Rev. 1 - July 2018

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MassDOT MW-1

RECOMMENDED PRACTICE

FOR THE

MAINTENANCE OF TRACK
AND SPECIAL TRACKWORK

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10 Park Plaza, Suite 4160
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MassDOT MW-1

RECOMMENDED PRACTICE

FOR THE

MAINTENANCE OF TRACK AND SPECIAL TRACKWORK

Director of Railroad Properties
Massachusetts Department of Transportation
10 Park Plaza, Suite 4160
Boston, MA 02116

Effective July 1, 2018

Chalita Belfield

Chalita Belfield
Director of Railroad Properties

Date: July 1, 2018

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RECOMMENDED PRACTICE

FOR THE

MAINTENANCE OF TRACK AND SPECIAL TRACKWORK

This Manual belongs to:

Name: ____

Employee #: ____

Address: ____

____

____

Phone:____

If this Manual is found,
please return it to the address below:

Director of Railroad Properties
Massachusetts Department of Transportation
10 Park Plaza, Suite 4160
Boston, MA 02116

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MassDOT MW-1

MANUAL REVISIONS

We welcome your comments on the MassDOT Manual. Please send all suggestions to:

Director of Railroad Properties
Massachusetts Department of Transportation
10 Park Plaza, Suite 4160
Boston, MA 02116

Suggested revisions to this Manual should be submitted in writing in accordance with the following format.

Section/Paragraph Number ______________________________

Page Number ____

Recommended Changes, Corrections, or Questions:

____

____

____

Submitted by:

Name ____

Operating Railroad Company ___________________________

Address ____

____

____

Phone ____

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MassDOT MW-1

RECOMMENDED PRACTICE

The Massachusetts Department of Transportation (MassDOT) is committed to providing the safest and most efficient rail service to our customers by maintaining and upgrading the Commonwealth's track infrastructure and assets using best industry recommended practice.

MassDOT has sought to contract with Operating Railroad Companies that will work cooperatively with MassDOT, and that will maintain the Commonwealth's track system at the required standards with competent and dedicated employees.

MassDOT requires their designated Operating Railroad Companies to perform diligent inspections, prepare maintenance and repair programs, and ensure the proper maintenance of track in accordance with the governing operating agreements.

Recommended Practice is based on the best practice developed by and in current use on the United States and Canadian passenger and freight railroads. They allow for a common language amongst railroad administrators, maintenance personnel, contractors, material and equipment suppliers and all others concerned with railroad safety.

Each of the Operating Railroad Companies are currently under agreement with MassDOT. The information found in this Manual contains tables, instructions, and references designed for track and special trackwork as a guide for maintenance personnel in their everyday efforts to maintain a safe and efficient plant.

The MassDOT Manual is a manual of recommended practice. We recognize that best practice of maintenance of way (MOW) continues to change due to the location, environment, operation, and geographic conditions of individual railroads.

The MassDOT Recommended Practice Manual is meant to aid and assist the Operating Railroad Companies to maintain MassDOT-owned tracks in a safe and efficient manner at a reasonable cost. Performing maintenance in accordance with the recommended practice in the MW-1 will meet the expectations of the Commonwealth and provide uniform practice between the different properties of the Operating Railroad Companies.

As of July 2018, the Operating Railroad Companies operate rail freight service and maintain the MassDOT-owned track infrastructure pursuant to License and Operating Agreements with MassDOT on the following line segments:

- Adams Industrial Track: MP 0.0 to MP 5.2
- Conn River Main Line: MP 0.38 to MP 49.7
- Housatonic Railroad: MP 50.0 to MP 85.9
- Massachusetts Central Railroad: MP 1.6 to MP 25.0
- Framingham Secondary: MP 0.0 to MP 21.05
- Middleboro Subdivision:
    - Attleboro Secondary: MP 0.0 to MP 8.6
    - New Bedford Secondary: MP 8.6 to MP 13.3
    - Middleboro Branch: MP 13.3 to MP 21.1
- New Bedford Secondary: MP 13.3 to MP 31.8
- Fall River Secondary: MP 0.0 to MP 12.0
- Cape Main Line:
    - Buzzards Bay Secondary: MP 36.3 to MP 54.7
    - Hyannis Secondary: MP 55.0 to 78.5
- Falmouth Secondary: MP 0.0 to MP 6.8
- South Dennis Secondary: MP 0.0 to MP 2.8
- Dean Street Industrial Track: MP 0.0 to MP 1.5
- Watuppa Branch: MP 6.0 to MP 8.0

MassDOT MW-1

PURPOSE AND USE

The MassDOT MW-1 was developed for MassDOT Rail and Transit Division and selected Operating Railroad Companies who have contracted with MassDOT Rail and Transit Division to operate and maintain lines of track owned by the Commonwealth, as a manual of best practice for the maintenance of track and associated trackwork components. Materials presented in this handbook establish and define MassDOT Rail and Transit Division recommended practice for maintenance of track owned by MassDOT Rail and Transit Division and operated by Operating Railroad Companies under contractual agreements with MassDOT Rail and Transit Division. These practices have been developed to meet the needs of the MassDOT Rail and Transit Division and may be used exactly as presented or modified as is necessary and desirable to meet the present and future needs of the Railroads operating and maintaining MassDOT Rail and Transit Division rail lines, in accordance with the terms of the governing License and Operating Agreements.

In all cases, inspection and restoration of track must be performed in accordance with Federal Railroad Administration (FRA) Part 213, Track Safety Standards.

The intent of the recommended practice is not to establish artificially rigid procedures governing track maintenance but rather to serve as guidelines for prudent track maintenance practice. These guidelines must be used in concert with proper exercise of judgment based upon experience and knowledge of service requirements.

The maintenance limits in the MassDOT MW-1 are unique and are intended to supersede the inspection and restoration limits given in FRA Part 213, provided that the more restrictive practices should be followed. For example, the track gage limits given in the MassDOT MW-1 (53.0(M)) are more restrictive than the track gage limits found in FRA Part 213 (§213.53).

Track maintenance limits and recommended practice in the MassDOT MW-1 are to be used for everyday maintenance activities. The limits act as a trigger to prompt the maintenance or reconstruction of track. The track and related rail infrastructure must be maintained in accordance with the requirements of the relevant License and Operating Agreement between MassDOT Rail and Transit Division and the Operating Railroad

Company. The Commonwealth expects that wherever possible, track shall be maintained so that the track structure does not fall below track maintenance limits established in the MassDOT MW-1.

In all cases, MassDOT Operating Railroad Companies will strive to restore track, make track repairs, and maintain track at or above the respective maintenance limits given in the MassDOT MW-1.

The development of the MassDOT MW-1 involved many hours of input from railroad professionals, and represents the latest recommended practice approved by the MassDOT Director of Railroad Properties. It is understood that these practices are subject to revisions as new technology and improved techniques are established. Other practices may be found to be equally acceptable and, as a result, the materials contained in the MassDOT MW-1 may be modified from time to time to promote the understanding of and efficiency and economy of maintenance of MassDOT-owned rail lines.

The MW-1 is an interactive document. It is expected that every individual that has reason to use this document will constantly strive to offer suggestions and constructive criticism to improve the overall understanding, use, and quality of this Manual.

Modifications to these recommended practice materials must be made in writing, and incorporated into the Manual following approval by MassDOT Rail and Transit Division.

MassDOT MW-1

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RECOMMENDED PRACTICE

FOR THE

MAINTENANCE OF TRACK AND SPECIAL TRACKWORK

Rev. 1 - July 2018

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SUBPARTS A-E

RECOMMENDED PRACTICE FOR THE MAINTENANCE OF TRACK

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Subpart A - General

§1.0(M) SCOPE

(a) Maintenance is both spot and out-of-face replacement of components of the track structure such as laying new or relay rail or installing ties so as to maintain the infrastructure in a state-of-good repair.

- (1) Maintenance limits are to be used as a triggering mechanism that prompts maintenance or reconstruction.
- (2) It is MassDOT's policy to have a track structure that stays between new construction and maintenance limits.
- (3) As the track structure wears, maintenance should be programmed before the track reaches the MassDOT maintenance limits.
- (4) Should these maintenance limits be exceeded, maintenance must be completed prior to reaching the limits found in FRA Part 213.
- (5) Whenever possible, track should be repaired or reconstructed to new track tolerances.

(b) This subpart provides practices that will be used for the maintenance of track. It is for the guidance of Operating Railroad Companies that maintain and repair track.

(c) This subpart contains "maintenance limits" that are to be used when maintaining track and are not to be confused with the minimum limits found in FRA Part 213 or with new track tolerances.

§3.0(M) APPLICATION

The MW-1 applies to all operating railroads that have maintenance and compliance responsibility on MassDOT-owned railroad property.

§5.0(M) MAINTENANCE

(a) The responsible personnel in charge of performing the maintenance work for the Operating Railroad Companies shall be qualified to maintain, restore, or renew trackwork in accordance with FRA §213.7(a), (b), (c) and (d).

(b) The person responsible for the work shall coordinate and report all maintenance work on the appropriate form to the Operating Railroad Company and MassDOT Rail and Transit Division.

(c) A record of all maintenance performed and all required inspection reports shall be maintained by the Operating Railroad Company for the duration of their operating contract. Reports to be provided are as follows:

- (1) Track Inspection Reports (planned and special)
- (2) Switch Inspection Reports (planned and special)
- (3) Rail Defect Inspection Reports:
  - Detector Car Report (car to be ridden by Operating Railroad Company Official)
  - Rail Failure Report
- (4) Reports included in CWR procedures section (see Appendix A, "Continuous Welded Rail (CWR) Procedures").

§7.0(M) DESIGNATION OF QUALIFIED PERSONS TO SUPERVISE CERTAIN RENEWALS AND INSPECT TRACK

(a) Each Operating Railroad Company to which this Part applies shall designate qualified persons to supervise restorations and renewals of track under traffic conditions. Each person designated shall have:

- (1) At least:
    - (i) 1 year of supervisory experience in railroad track maintenance; or
    - (ii) A combination of supervisory experience in track maintenance and training from a course in track maintenance or from a college level educational program related to track maintenance;
- (2) Demonstrated to the owner that he or she:
    - (i) Knows and understands the requirements of this Part that apply to the restoration and renewal of the track for which he or she is responsible;
    - (ii) Can detect deviations from those requirements; and
    - (iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and
- (3) Written authorization from the track owner to prescribe remedial actions to correct or safely compensate for deviations from the requirements in this Part.

(b) Each Operating Railroad Company to which this Part applies shall designate qualified persons to inspect track for defects. Each person designated shall have:

- (1) At least:
    - (i) 1 year of supervisory experience in railroad track maintenance; or
    - (ii) A combination of supervisory experience in track maintenance and training from a course in track maintenance or from a college level educational program related to track maintenance;
- (2) Demonstrated to the owner that he or she:
    - (i) Knows and understands the requirements of this Part that apply to the inspection of track for which he or she is responsible; and
    - (ii) Can detect deviations from those requirements; and
    - (iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and
- (3) Written authorization from the track owner to prescribe remedial actions to correct or safely compensate for deviations from the requirements in this Part, pending review by a qualified person designated under Paragraph (a) of this section.

(c) Individuals designated under Paragraphs (a) or (b) of this section that inspect continuous welded rail (CWR) track or supervise the installation, adjustment, and maintenance of CWR track in accordance with the written procedures of the track owner shall have:

- (1) Current qualifications under either Paragraphs (a) or (b) of this section;
- (2) Successfully completed a comprehensive training course specifically developed for the application of written CWR procedure issued by the track owner;
- (3) Demonstrated to the Operating Railroad Company that the individual:
    - (i) Knows and understands the requirements of those written CWR procedures; and
    - (ii) Can detect deviations from those requirements; and

(iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and

(4) Written authorization from the Operating Railroad Company to prescribe remedial actions to correct or safely compensate for deviations from the requirements in those procedures and successfully completed a recorded examination on those procedures as part of the qualified process.

(d) Persons not fully qualified to supervise certain renewals and inspect track as required in Paragraphs (a) through (c) of this section, but with at least one year of maintenance of way (MOW) or signal experience, may pass trains over broken rails and pull-aparts provided that:

  (1) The Operating Railroad Company determines the person to be qualified and, as part of doing so, trains, examines, and re-examines the person periodically within two years after each prior examination on the following topics as they relate to the safe passage of trains over broken rails or pull-aparts: rail defect identification, crosstie condition, track surface and alignment, gage restraint, rail end mismatch, joint bars, and maximum distance between rail ends over which trains may be allowed to pass. The sole purpose of the examination is to ascertain the person’s ability to effectively apply these requirements and the examination may not be used to disqualify the person from other duties. A minimum of four hours training is required for initial training;

  (2) The person deems it safe and train speeds are limited to a maximum of 10 MPH over the broken rail or pull apart;

  (3) The person shall watch all movements over the broken rail or pull apart and be prepared to stop the train if necessary; and

  (4) Person(s) fully qualified under FRA §213.7 are notified and dispatched to the location promptly for the purpose of authorizing movements and effecting temporary or permanent repairs.

§8.0(M) QUALITY CONTROL

(a) The person in charge of performing the maintenance activity or repair shall be responsible for the overall quality of the work performed.

(b) All maintenance work shall be performed in accordance with this Part.

(c) The Operating Railroad Company shall review the work performed for quality, consistency, and compliance to this Part.

(d) Trackwork repairs that are deficient:

  (1) Shall be brought to the attention of the Operating Railroad Company.

  (2) May be cause for remedial action.

(e) The Operating Railroad Company shall see that any additional work necessary is performed to bring the repair into compliance with this Part.

(f) The Operating Railroad Company shall be responsible to re-inspect the corrected work to ensure that it is in compliance with this Part.

(g) The Operating Railroad Company is encouraged to make recommendations to the MassDOT Rail and Transit Division as to required modifications to methods, procedures, and practice to improve the overall quality of the work.

§10.0(M) SIDINGS

Maintenance of Way (MOW) forces maintain up to the derail and/or property line on industrial siding tracks.

Subpart B - Roadbed and Right-of-Way

§31.0(M) SEASONAL PREPARATION AND MAINTENANCE

(a) Fall/Winter
   (1) Dig out switch (gas, electric) rods
   (2) Check heaters
   (3) Before winter, clean sand out of flange ways at all highway grade crossings
   (4) Keep crossing ends and flanges clear of snow and ice
   (5) Ensure adequate supplies of materials/tools and snow equipment
   (6) Order frost spikes/shims
   (7) Order rope and drift pins from approved supplier and prepare for usage (to heat rail)
   (8) Clean snow from switches at switch points, frog points and guard rails
   (9) Obtain cleaner and lubricate Sargeant and Greenleaf switch locks

(b) Spring/Summer (Special Inspections after Acts of Nature)
   (1) Verify proper neutral temperature of rail installed at less than the desired neutral temperature range and adjust as required (see Appendix A, “Continuous Welded Rail (CWR) Procedures”).
   (2) Plan vegetation control.
   (3) Remove temporary shims/spikes.
   (4) Bring winter equipment back to central headquarters.
   (5) Perform heat patrol (kinks).
   (6) Perform rain storm patrols – inspection and cleaning of culverts.
   (7) Check and cross-cut joints in track.
   (8) Lubricate main line hand throw and yard switches.

§33.0(M) DRAINAGE

(a) Drainage is of prime importance for the maintenance of track. Water mixing with materials in the roadbed tends to make the entire track structure unstable.

(b) Water seeping or flowing toward the track should be carried across and off the roadbed or be intercepted and diverted before it reaches the roadbed.

(c) Water falling upon the roadbed should be quickly drained off to side ditches or drainage structures.

(d) Every effort should be made to see that water from adjacent property does not drain on the MassDOT right-of-way. In areas where this condition is observed the MassDOT Rail and Transit Division shall be notified.

(e) Cross drains should be installed and maintained, particularly where bridges, road crossings, and sags interfere with longitudinal drainage.

(f) Maintenance of drainage systems must satisfy the requirements of FRA §213.33.

(g) Distribution of track or construction materials, and the disposal of fouled ballast and ditch materials, should be handled in such a manner that they no longer interfere with track drainage.

(h) Operating Railroad Company shall notify the MassDOT Rail and Transit Division any time debris is dumped on MassDOT property by abutters.

§33.1(M) Culverts

(a) Culverts require regular inspection and maintenance as do other railroad structures. When making inspections of track and roadway, MassDOT' s Operating Railroad Companies should:

  (1) Railroad shall have and maintain an updated list of all culvert locations within the right-of-way. Inspectors should be aware of the location of culverts within the right-of-way.

  (2) The tie over the culvert should be painted white and web of rail shall be marked with mile post location.

  (3) Be aware that culverts must not only support the live load of trains but the dead load of the track structure.

  (4) Report the backup of water near culverts or any abnormal conditions around the ends of culverts (e.g., water seeping through ballast structure).

  (5) Report any abnormal conditions found in the track structure at a culvert (e.g., loss of ballast). Operating Railroad Company shall then notify the MassDOT Rail and Transit Division.

  (6) If unusual conditions are found at culvert locations, take appropriate remedial action. Appropriate remedial action shall be taken by a Operating Railroad Company qualified individual.

  (7) For additional information on culverts, see American Railway Engineering and Maintenance Association (AREMA), Chapter I, Part 4, "Culverts."

§35.0(M) CROSS SECTION (ROADWAY)

Wherever possible, roadbeds, embankments, and excavations should be maintained in accordance with the Massachusetts Bay Transportation Authority (MBTA) Book of Standard Plans. Deviation from approved cross sections should not be made without authorization from the MassDOT Rail and Transit Division.

§37.0(M) VEGETATION

(a) Growth of vegetation should be encouraged on slopes of embankments, cuts, and deep ditches to prevent erosion and to maintain stability.

(b) Vegetation growth must be controlled in accordance with the requirements of FRA §213.37.

(c) The goal of MassDOT is to have the right-of-way cleared of both brush and vegetation in the track and to within 25' of the track centerline. This should be accomplished using a combination of brush cutting and weed spraying.

(d) Vegetation on railroad property, which is on or immediately adjacent to roadbed, must be controlled so that it does not:

  (1) Become a fire hazard to track-carrying structures;

  (2) Obstruct visibility of railroad signs and signals;

    (i) Along the right-of-way

    (ii) At highway-rail crossings

  (3) Interfere with railroad employees performing normal trackside duties;

  (4) Prevent proper functioning of signal and communication lines; or

  (5) Prevent railroad employees from visually inspecting moving equipment from their normal duty stations.

(e) The Operating Railroad Companies shall develop and carry out vegetation management programs as required by MassDOT.

(f) The Operating Railroad Companies shall provide copies of their approved management programs to the MassDOT Rail and Transit Division.

§39.0(M) SIGNS

(a) Track signs and posts must be placed and maintained in accordance with either the MBTA Book of Standard Plans and/or AREMA Chapter 1, Part 7 Roadway Signs and operating special instructions. They should not be installed so as to interfere with signals or safety appliances.

(b) The following is a list of the common signs, which are maintained by the Operating Railroad's Maintenance of Way Department:

   (1) Whistle Posts (see Paragraph (c) for placement)
   (2) Permanent Speed Restriction Signs (see Operating Railroad Company Time Table Special Instructions) (MBTA Standard Plan No. 3304)
   (3) Temporary Speed Signs (see Appendix D)
   (4) Mile Posts (see appropriate Track Charts) (MBTA Standard Plan No. 3302)
   (5) Station Markers (see Operating Railroad Company Time Table Special Instructions)
   (6) End of Block (see Operating Railroad Company Time Table)
   (7) Stop Boards (see Operating Railroad Company Time Table)
   (8) Clearance Marker (fouling point) painted rail or ties in yellow
   (9) Close Clearance Markers (MBTA Standard Plan No. 3312)
   (10) Yard Limit Signs (see Operating Railroad Company Time Table) (MBTA Standard Plan No. 3304)
   (11) Switch Targets (MBTA Standard Plan No. 3030)
   (12) Spring Switch Markers (SS) (MBTA Standard Plan No. 3304)
   (13) No Trespassing/No Dumping Signs (MBTA Standard Plan No. 3208)
   (14) Cross Bucks (Passive) (MBTA Standard Plan No. 3388)
   (15) Crossing Approach Circuit Signage (XC) at Highway Grade Crossing
   (16) Emergency Notification Sign at all Public and Private Grade Crossings (as per FRA Requirements) (Manual on Uniform Traffic Control Devices (MUTCD) Figure 8B-5)
   (17) Bridge Markers (undergrade and overhead bridges)
   (18) Culvert Markers (mark on web of rail and paint ties white)
   (19) Track Lubricator Signage
   (20) Buried Cable Signs (MBTA Standard Plan No. 3344)
   (21) Low Ground Clearance at Grade Crossings (MUTCD Figure W10-5 and W10-5P)
   (22) Snow Flanger Sign (MBTA Standard Plan No. 3304)
   (23) Will Not Clear Man on Side of Car (MBTA Standard Plan No. 3314)

(c) Whistle post placement:

   (1) Whistle posts are placed 1,320' in advance of a public grade crossing so as to comply with Massachusetts General Law (MGL), Chapter 160 "Railroads," Section 138 "Warning to Public."

§41.0(M) HIGHWAY GRADE CROSSINGS

(a) Typical grade crossing surfaces found on the MassDOT are as follows (see also MBTA Standard Plan Nos. 3100, 3106, 3108, 3120):

  (1) Timber

  (2) Timber and asphalt

  (3) Asphalt with cut flangeways

  (4) Asphalt with rubber rail seal

  (5) Full depth rubber

  (6) Full depth concrete

  (7) Full depth rubber on the gage and rail seal and asphalt on the field side

  (8) Special products as approved by the MassDOT Rail and Transit Division at grade crossings or at pedestrian crossings

§41.1(M) Placement of Devices at Grade Crossings

(a) Whistle signs shall be installed in accordance with Commonwealth of Massachusetts requirements (see §39.0(M)(c)).

(b) The design and placement of grade crossing signage, roadway signage, and appliances at both public and private grade crossings are governed by the Manual on Uniform Traffic Control Devices (MUTCD, see Part 8).

(c) Low ground clearance at grade crossings (see the MUTCD).

§41.2(M) Highway Grade Crossing Maintenance

(a) All roadway signs, highway traffic signal systems, and pavement markings are maintained by the municipality and/or Commonwealth.

(b) The railroad warning devices whether passive or active are maintained by the Operating Railroad Companies.

(c) At private grade crossings, any paving markings or highway signage is the responsibility of the roadway owner. The Emergency Notification Sign is the responsibility of the Operating Railroad Companies.

(d) Crossings should be kept clean and attention given to the following:

  (1) Drainage: sloping the surface, if necessary, and constructing underground drains, as required.

  (2) Surface water flowing along the highway toward the railroad should be diverted before it reaches the tracks.

  (3) The ends of the crossing shall extend at least 2' beyond the width of the highway. Crossing surface installed in a gated pedestrian walkway area should be restricted to the width of the sidewalk gate.

  (4) It is recommended that the ends of the crossing surfaces be protected by either end deflector plate/ballast or asphalt to prevent against dragging equipment.

  (5) Flangeways shall be 2-1/2" wide and not less than 2" deep. They must be kept clean at all times and free of debris, ice, and snow.

  (6) Crossing surface materials and components should be inspected, aligned, and properly secured to the track structure so that the materials cannot damage rolling stock and/or motor vehicles. Crossing surface material that cannot be properly secured and/or repaired shall be removed and temporarily replaced with cold patch or asphalt.

(7) The four quadrant site distances for vehicles approaching the highway grade crossing shall be kept as clear as practicable.

(8) When installing or making general repairs to crossings, track alignment should be established by transit and/or mechanical lining devices.

(9) The condition of crossing approaches is vital to the performance of a grade crossing. Special attention should be paid to the surface and alignment on the crossing approaches so that the ties are tamped and there is a smooth transition into the crossing area.

(10) Special attention should be paid to the maintenance of joints and welds at crossing ends. This includes insulated and conventional track joints, as well as field and plant welds. When performing maintenance, track joints should be eliminated as soon as possible.

(11) Joints must be avoided within the area of the crossing panel.

(12) When working at a crossing, rail should be observed under load to determine if there is excessive rail movement. As track deflects under load, cut spikes tend to loosen. Loose and worn fastening systems should be repaired and/or replaced as necessary to minimize all track and crossing surface movement.

(13) In an emergency (broken weld or rail), when welding joints within the limits of the crossing panel, closure welds may be made by the thermite process.

(14) When changing a broken rail in a crossing, ensure that all clips, spikes, plates, and excessively worn components are replaced and secured. Galvanized clips should be installed. Ties should be tamped. Rails temporarily joined with joint bars should be field welded as soon as practicable. If the broken rail is replaced in CWR territory refer to Appendix A, “Continuous Welded Rail (CWR) Procedures” for proper rail adjustment procedures.

(15) Use of gage rods in crossings is prohibited.

(16) Fastening and clipping devices shall be used that do not interfere with the installation of the crossing surface materials.

(17) Galvanized clips should be used in crossings with an elastic fastening system.

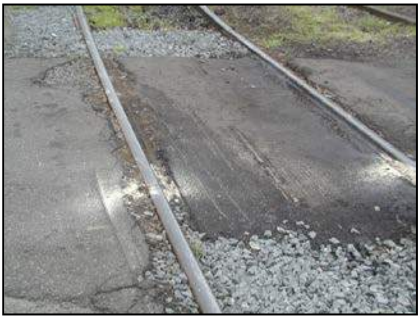
(18) Seasonal clearing of silt and other debris from both crossing approaches.

(19) Clean out flangeways in the Fall (e.g., sand and dirt).

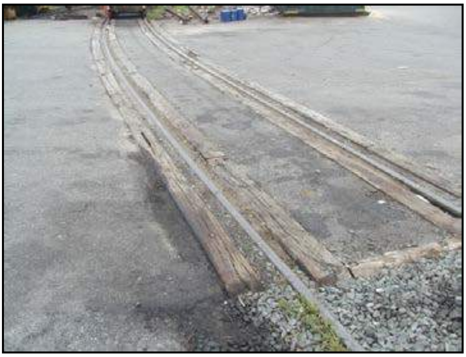
(e) All new crossings must be complaint with the Americans with Disabilities Act (ADA).

(f) MassDOT has a number of different types of highway grade crossings types. Pictures of the more common types are shown below:

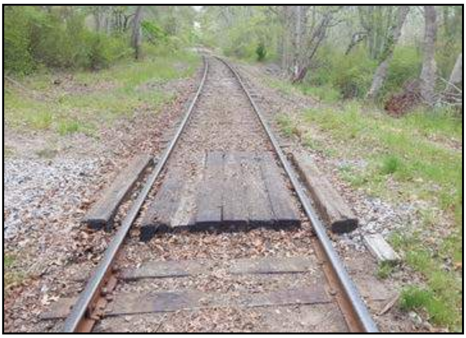
(1) Asphalt With Cut Flangeway (not recommended for mainline track except overnight during crossing renewals or for emergency repairs).



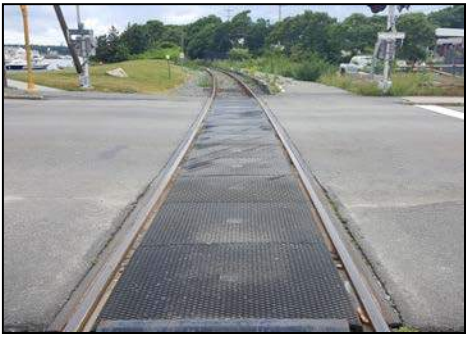
(2) Timber and Asphalt



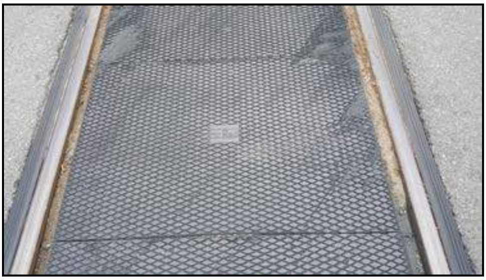
(3) Timber



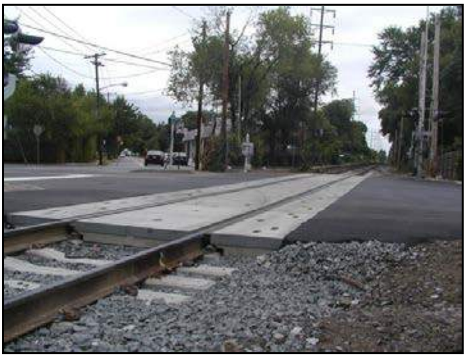
(4a) Full Depth Rubber with Rail Seal



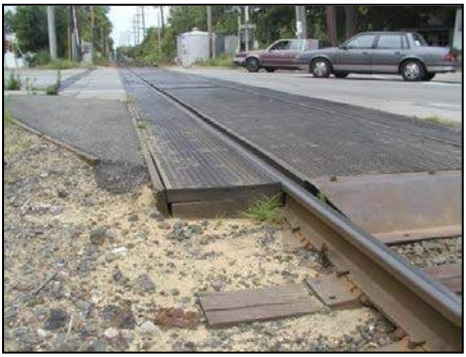
(4b) Full Depth Rubber with Rail Seal



(5) Full Depth Concrete on Wood or Concrete Ties



(6) Rubber Flangeway and Asphalt



Subpart C - Track Geometry

§53.0(M) GAGE

§53.1(M) Standard for Gage

(a) The standard gage for track, measured between the running rails at right angles to the track, 5/8" below the top of rail, is 56-1/2".

(b) Gage will be 56-1/2" unless specified by the MassDOT Rail and Transit Division.

(c) When gaging is required, care should be taken to not adversely affect the alignment of the track. Changes in prescribed gage should be made in uniform increments as given in §53.2(M).

(d) Gage shall be changed by adjustment of the rail opposite the line rail (preferred method).

(e) In some cases, gage may be adjusted on the line rail only if the adjustment will improve line and ride quality (e.g., joint elbowed out on the line rail).

(f) In cases where the line rail is re-aligned, re-spike line high rail and then re-gage the low rail.

§53.2(M) Maintenance of Gage

(a) Gage shall be measured with a standard track gauge or other authorized devices. These devices must be checked daily prior to use for accuracy.

(b) Maintenance shall be performed when gage reaches the following limits:

Gage Maintenance Limits

Class of Track	Minimum (Inches)	Maximum (Inches)	Maximum Rate of Change in Gage per 31' (Inches)
1	56-1/8	57-1/2	1
2	56-1/8	57-1/4	3/4
3	56-1/4	57-1/4	3/4
4	56-1/4	57	1/2
5	56-1/4	57	1/2

(c) Gage rods shall be applied only in emergency situations for temporary repair. Permanent repairs to gage should be completed as soon as possible. On main line tracks, gage rods shall only be installed in an emergency and removed as soon as possible.

(d) When using gage rods in signal territory, insulated rods are to be tested by the Signal Maintainer prior to installation. When permanent repairs are completed, gage rods are to be completely removed.

§55.0(M) ALIGNMENT

Alignment is the horizontal location of a railroad as described by curves, spirals, and tangents.

§55.1(M) Maintenance of Alignment

(a) Outer rails of curves and field side rails on tangents should be selected as the line rails. On single tangent track, either rail may be used as the line rail, however, the north or east rail is the preferred line rail. The same line rail shall be used for the full length of the track tangent.

(b) In general, alignment information may be obtained using the following:

(1) The stringline method.

(2) Surveying equipment or a rail-mounted laser.

(3) The automatic geometry system on an approved tamper.

(4) Track geometry car.

(c) Maintenance shall be performed when alignment values reach the limits given in the table below.

(1) Alignment deviation in curves, as defined in this table, is the difference in mid-ordinate value between adjacent stations and not the average of multiple stations (uniformity) as defined in FRA §213.55.

(2) The definition of alignment deviation used in this paragraph, allows the maintainer to achieve alignment tolerances that are more restrictive than those defined in FRA §213.55.

Alignment Maintenance Limits

Class of Track	**Tangent Track**	**Curved Track**	
	The deviation of the mid-offset from a 62' chord(1) may not be more than (Inches):	**The deviation of the mid-ordinate from a 31' chord(2) may not be more than (Inches):**	**The deviation of the mid-ordinate from a 62' chord(2) may not be more than (Inches):**
1	3-3/4	N/A(3)	3-3/4
2	2-1/4	N/A(3)	2-1/4
3	1-1/4	7/8	1-1/4
4	1	3/4	1
5	1/2	3/8	1/2

Notes:

(1) The ends of the line shall be at points on the gage side of the line rail, 5/8" below the top of the railhead. Either rail may be used as the line rail; however, the same rail shall be used for the full length of that tangential segment of track.

(2) The ends of the line or chord must be at points on the gage side of the line rail, 5/8" below the top of the rail head. Use line rail in accordance with §55.1(M).

(3) N/A – Not Applicable.

(d) Designation of line rail:
  (1) On tangent track in single track either rail or rail on the mile post side.
  (2) On tangent track and multiple tracks the field side rail.
  (3) In single or multiple tracks in curves on the high/outer rail.

(e) Curve realignment changes in CWR territory must be made in accordance with Appendix A, “Continuous Welded Rail (CWR) Procedures.”

(f) Alignments must be maintained within the prescribed limits given above. Roadway clearances are prescribed in AREMA, Chapter 28 (see Table 28-3-3, “Legal Clearance Requirements by State” (in English Units)).

§55.2(M) Stringlining Curves

(a) Stringlining of curves is a method for determining the most advantageous alignment that can be obtained with reasonable amounts of throw.

(b) Any of the established numerical or mathematical methods, such as the automated geometry system on tampers, the “Bartlett Method” or “Bracket Method,” may be used to calculate the throws of curves.

(c) The practical relationship between station and chord length, mid-ordinate value, and degree of curvature for station lengths most commonly used is shown below:

Degree of Curve	Mid-Ordinate	Station Length	Chord Length
1°	1"	31'	62'
1°	1/4"	15'-6"	31'

(d) In higher degree curves, shorter station lengths and chords are to be used. It may be desirable to use longer station lengths and chords for curves less than 30 minutes.

(e) Basic stringlining principles:
  (1) The mid-ordinates of a curve are indicative of its degree of curvature.
  (2) The mid-ordinates of a uniform circular curve are equal when measuring offsets using chords of equal length.
  (3) The mid-ordinate varies directly with the degree of curvature.
  (4) Where track is thrown in or out at any single station on the curve, the mid-ordinate of the curve at the station is affected by the amount of the throw and the mid-ordinates at the adjacent stations are affected by half the throw amount, but in the opposite direction.
  (5) All calculations should be checked to ascertain that the calculated throws will actually produce the required changes in mid-ordinates.

§55.2.1(M) Stringline Procedures: Road Worker Protection (RWP) and Personal Protection Equipment (PPE)

(a) Ensure area to be stringlined has the proper RWP Procedures in effect.

(b) A minimum of three people is required when using conventional stringline equipment.

(c) Many curves have grease on the rails with residual amounts on the ties and ballast so caution needs to be taken when walking in areas to be stringlined.

(d) Wear Operating Railroad Company’s designated PPE, to include gloves that protect hands from getting dirty.

(e) Ensure that all stringline equipment is cleaned after use.

§55.2.2(M) Stringline Procedures: Items/Tools Required:

(a) Keel or crayon marker

(b) Writing instrument

(c) Stringline data sheet (as given below) with clip board

(d) 100' cloth tape with 6' folding wood ruler

(e) Stringline paddles with string

(f) Ordinate ruler

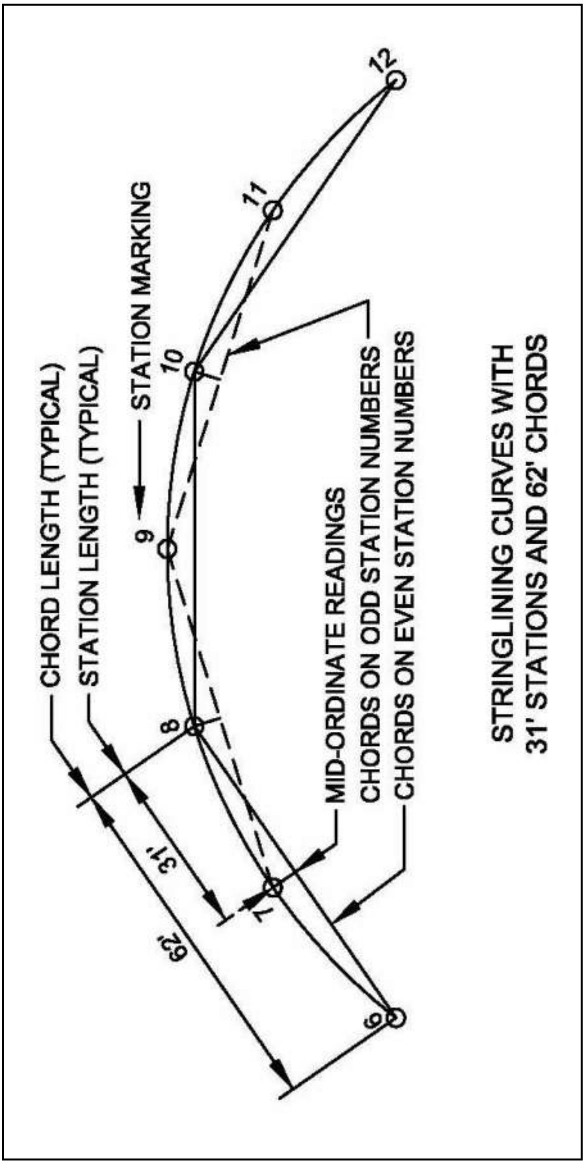
(g) Level board

§55.2.3(M) Stationing Curves and Obtaining Stringline Data

(a) The figure below shows a typical curve with stationing marked out in keel and the chords in place for measurement of mid-ordinates.

(b) Ordinate readings are taken at odd and even stations.

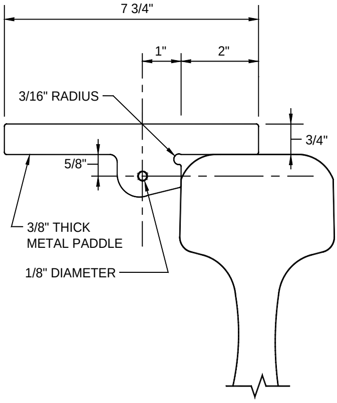
(c) A chord length of 62' is the chord used for this stationing.



Stringlining of Curves

(d) Stationing shall begin at a point on the tangent far enough ahead of the curve to permit the measurement of any reverse curvature or “dog-leg.” Stationing shall continue throughout the curve to a point on the tangent five stations beyond the tangent point to permit measurement of any reverse curvature. Mark stations on rail web with keel.

(e) When obtaining mid-ordinate date, stringline paddles should be used to position the string a distance of 1" away from the gage line of the rail, so as to locate and permit measurement of any local deviations in the curve. A typical stringline paddle is shown below.



STRINGLINE PADDLE

SCALE: 3"=1'-0"

Note: In curved track, measurements are taken on the gage side of the high rail (line rail) if possible. If not, field side of low rail may be used.

(f) The Stringline Data Form should be used to record field measurements and for making mathematical calculation (see §55.2.4(M)).

(g) When a conventional ruler is used to measure the mid-ordinate, the actual scale reading should be recorded and a correction made to the mid-ordinate value to compensate for any offset of the stringline from the rail. Conventional stringline paddles require that 1" be subtracted from the readings taken to give the correct mid-ordinate value.

(h) Mid-ordinate measurements should be taken (with an accuracy of 1/16"+/-) with the stringline pulled taut, not affected by the wind, and with the stringline paddles and the scale held horizontal and perpendicular to the gage face of the rail.

(i) Track center lines should be measured and recorded at every station in a two or more track territory. The distance from centerline of track to any obstruction that might interfere with the lining of the curve should be measured and recorded so that limiting throws for these tight spots may be determined.

(j) The apparent location of the curve points Tangent to Spiral (TS), Spiral to Curve (SC), Curve to Spiral (CS) and Spiral to Tangent (ST) should be noted when stationing the curve as appropriate so that the relationship between alignment and required superelevation can be determined.

(k) At all station locations record:

  (1) Crosslevel as read by a level board.

  (2) Gage as read from the 6' ruler (or calibrated level board).

  (3) Track centers if in multiple track territory.

  (4) Physical features in the field such as crossings, turnouts, field or plant welds, joints, curve tags, bridge girders, grease pots, impedance boxes, etc., that may affect the ability to throw a curve.

55.2.4(M) Stringline Data Form

(a) Below is an example of a Stringline Data Form to be filled out when stringlining a curve.

CURVE ID. __________

MassDOT RAILROAD STRINGLINE DATA FORM

BRANCH _________ **MP**_________ **TRACK** _________ **CHORD (Ft.)** _________ **STATION (Ft.)** _________ **ORDINATE** _________

DEGREE: _______________________

PRES. ELEV: _______________________

PROP. ELEV: _______________________

DATE MEASURED:
____

DATE LINED: ___________

DATE TAGGED:
____

COMPUTED BY:
____

APPROVED BY:
____

DATE: _________________________

STATION 0 AT ______________ **END**

STA. NO.	TRACK CENTERS	EXIST. GAGE	EXIST. ELEV.	EXIST. ORD.	NOTES	CLEARANCE TO FIXED OBJECT	FINAL ORD.	PROP. ELEV.	THROW	STA.

§57.0(M) CURVES: ELEVATION AND SPEED LIMITATIONS

§57.1(M) General

(a) Elevation, or superelevation, is the vertical distance of the outer rail of a curve above the inner rail. It is provided to overcome or partially overcome the effects of curvature and speed.

(b) Passenger railroads primarily elevate curves to provide adequate ride quality.

(c) Freight railroads primarily elevate curves to provide ride quality and reduce rail wear.

(d) Maximum authorized speed (MAS) for a curve is that specified in the current Operating Railroad Company's Employee Timetable.

§57.2(M) Superelevation

(a) The MassDOT Rail and Transit Division shall establish the amount of superelevation and underbalance to be placed and maintained on each curve.

(b) The superelevation should not exceed values given in Appendix C, "Underbalance Table - Maximum Allowable Operating Speed On Curves."

(c) MAS shall be determined using 3" of unbalance (E_u).

§57.3(M) Superelevation Tags

(a) Curves should be tagged in the field. Points to be marked or tagged on the curves are: TS, SC, CS, and ST.

(b) Information on curve tags shall include the maximum design superelevation and the date the curve is elevated.

(c) Superelevation tags are placed as follows:

  (1) The TS and the ST tags are placed 1" off the tie plate and/or elastic fastener perpendicular to the high rail.

  (2) The SC and CS tags are placed 1" off the tie plate and/or elastic fastener parallel to the high rail.

§59.0(M) Elevation of Curved Track; Runoff

(a) If a curve or segment of a compound curve is elevated, the full elevation must be provided between points of full curvature throughout the curve, unless physical conditions do not permit. If the elevation does not extend throughout the curve, or segment of a compound curve, the minimum elevation must be used in determining the maximum allowable operating speed under FRA §213.57(b).

(b) Elevation runoff must be at a uniform rate, within the limits of track surface deviation prescribed in FRA §213.63 and it must extend at least the full length of the spiral. If physical conditions do not permit a spiral long enough to accommodate the minimum length of runoff, a maximum of 1" elevation may be run off in tangent track.

Maximum Authorized Speed (MAS)	Maximum Rate of Change in 31'
Up to 59 MPH	1/2"
60 to 90 MPH	3/8"

(3) At least 100' of tangent track, with zero crosslevel, shall be provided between the zero superelevation points in adjacent curves of opposite direction, or facing same hand turnouts, where practicable.

§61.0(M) CLEARANCES AND TRACK CENTERS

§61.1(M) Track Centers

(a) In maintaining alignment, the existing track centers, including equivalent centers on curves, must not be reduced below the minimum established for the territory.

(b) When surfacing track, any changes in track centers must be immediately reported to the Operating Railroad Company and the MassDOT Rail and Transit Division.

(c) In maintaining alignment, existing track center distances, including equivalent distances on curves, should not be decreased without the authority of the MassDOT Rail and Transit Division.

(d) If the measured track center in tangent track is less than 12'-6" notify the MassDOT Rail and Transit Division for guidance.

(e) On curves, the tangent track center must be increased as follows (see MassDOT MBTA Plan 1018):

  (1) Where the amount of superelevation is the same on adjacent tracks or the superelevation of the inner track is greater than the superelevation of the outer track, increase the tangent track center distance at a rate of 2" per degree of curve (CRDS(6)(D)(2)).[1]

  (2) Where the amount of the superelevation of the outer track is greater than the superelevation of the inner track:

    (i) Increase the tangent track center distance at a rate of 2" per degree of curve and 3-1/2" for each 1" difference in elevation between the outer and inner tracks (and/or tracks under consideration) (CRDS(6)(D)(4)).[1]

  (3) When aligning and super-elevating curves, the required increase in track centers should be as given in Paragraphs (e) (1) and (2) of this Part.

  (4) Track centers that do not meet the requirements of the MBTA Plan 1018 should be reported to the MassDOT Rail and Transit Division.

(f) Standard Tangent Track Center Dimensions:

  (1) The standard track center for tangent main line tracks is 14'-0".

  (2) Track centers of 13'-0" are permissible where 14'-0" centers are not possible as approved by the MassDOT Rail and Transit Division (CRDS (6)(D)(1)).[1]

(g) Track clearance information is given in the MBTA Book of Standard Plans. See:

  (1) Dwg. No. 1012: “Standard Clearances General Roadway Obstructions – Tangent Track”

  (2) Dwg. No. 1013: “Standard Clearances at Stations – Tangent Track”

  (3) Dwg. No. 1014: “Standard Clearances Tangent Track Signal Equipment & Utility Crossings”

  (4) Dwg. No. 1015: “Clearances for New Overhead Bridges”

  (5) Dwg. No. 1017: “Standard Clearances Tangent Track Bridges”

  (6) Dwg. No. 1018: “Standard Track Centers & Side Clearance Increases for Curved Track”

  (7) Dwg. No. 1019: “Clearances at Passenger Platforms”

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[1] MBTA Commuter Rail Design Standards Manuals, Vol. I, Revision 1, April 19, 1996.

§61.2(M) Horizontal Clearances

(a) Side Clearance Increase Because of Curvature:

(1) Side clearances must be increased on both the inside and outside of curves. This is to maintain equivalent tangent clearance on curves which is decreased due to:

(i) End overhang of equipment on the outside of curves, and;

(ii) Mid-ordinate swing-in on the inside or curves.

(2) Required side clearances increase on both inside and outside of curves:

(i) 1.5" per degree of curve (AREMA Chapter 28, Section 1.1).

(3) On curved track, side clearances shall be increased 1" per degree of curve. As recommended by AREMA Chapter 28, Section 1.1., Special Notes (1984), clearances to fixed obstructions should be increased within 80' of the curve (from TS and/or ST):

(i) Clearances to fixed objects within 80' of a curve should be increased at least as given in the table below:

Distance from Fixed Obstruction to Curve (TS and/or ST) (Feet)	**Increase in Clearance Per Degree of Curve (Inches)**
20	1-1/2
40	1-1/8
60	3/4
80	3/8

(4) Also see MBTA Standard Plan No. 1018.

(b) Side Clearance Increase Because of Superelevation:

(1) Side clearances on the inside or low side of the curve must be increased to compensate for the inward lean of the equipment when a curve has superelevation.

(2) The increased side clearance amount required to clear an object and/or obstruction is:

(i) Increased side clearances required in inches

$$= h/5 \times E_A,$$

Where:

h = height of obstruction/object in feet above top of rail.

E_A = actual elevation in curve at point in question in inches.

(3) See MBTA Standard Plan No. 1018.

§61.3(M) Vertical Clearances

(a) The minimum preferred vertical clearance required by the Commonwealth of Massachusetts is 22'-6" above top of rail.

(1) See AREMA, Section 3.6, “Legal Clearance Requirements by State.”

(2) See Table 28-33, for Massachusetts for both horizontal and vertical clearances.

(b) Compensation for Superelevation:

(1) If tracks are superelevated under an overhead (OH) structure:

(i) Vertical clearance must be increased to accommodate the required vertical clearance out to a point 7'-0" from the centerline of track on a plane parallel to the top of rail of the superelevated track (CRDS (6)(B)(3)).[2]

(2) Relative to the low rail and/or grade rail, the required vertical clearance in superelevated curves is increased by the amount (inches) calculated below:

(i) Increase in Vertical Clearance Required = 143 E_A

Where:

E_A = Superelevation in curve at point of interest

(c) Compensation in Vertical Clearance for Vertical Curves:

(1) When a vertical curve exists under an overhead structure and/or obstruction, additional clearance is required to:

(i) Accommodate the vertical mid-ordinate of railway equipment (cars and locomotives)

(2) For railway equipment up to 90' in length, the required increase in vertical clearance can be calculated as follows (CRDS(6)(B)(4)).[2]

(i) Increase in Vertical Clearance Required = $\frac{0.90 \times G_1 - G_2}{8}$

Where:

G_1 = Grade at point on vertical curve (PVC) in percent

G_2 = Grade at point on vertical tangent (PVT) in percent

§61.4(M) Clearance Limiting Objects

(a) For clearance limiting objects, see AREMA, Chapter 28, Table 28-3-3 “Legal Clearance Requirements by State” and the MBTA Book of Standard Plans.

(b) The clearance from the center line of track to objects within the right-of-way such as: signal appliances, signal bridge foundations, bridge abutments and platforms shall not be reduced without ascertaining that the final clearance to the object is no less than given in AREMA, Chapter 28, Table 28-3-3, “Legal Clearance Requirements by State” and the MBTA Book of Standard Plans.

§62.0(M) GRADES

§62.1(M) Grade Limitations

(a) The maximum design gradient shall be 1-1/2% and may be exceeded only with the approval of the MassDOT Rail and Transit Division.

(b) Storage and/or yard track grades shall be level where existing grades and obstructions permit.

(c) When reconstructing track, the existing profile must be retained except where it is possible to reduce the severity, length or the number of grades.

(d) Frequent changes in gradient shall be avoided as this introduces more vertical curves into the geometry and may degrade ride quality and increase train resistance.

(e) The preferred minimum length of vertical tangent is 300'**.**

(f) However, an absolute minimum length of 100' is required (unless approved by the MassDOT Rail and Transit Division).

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[2] MBTA Commuter Rail Design Standards Manuals, Vol. I, Revision 1, April 19, 1996.

§62.3(M) Horizontal Curves/Minimum Tangent Lengths

(a) For spiraled compound or reverse curves, the above minimum tangent length between spirals and/or curves is as follows:

  (1) A minimum tangent length of 100' on main tracks.

  (2) A minimum tangent length of 85' on secondary tracks.

  (3) An absolute minimum tangent length of 65', if approved by the MassDOT Rail and Transit Division.

§63.0(M) TRACK SURFACE

§63.1(M) General

(a) Track surface is the relationship of opposite rails to each other in profile and crosslevel.

(b) Track profile is the running surface along the top of the grade rail.

(c) Crosslevel is the difference in elevation across opposite rail heads measured at right angles to the track alignment.

(d) The ideal surface is a uniform profile consisting of constant grades connected by vertical curves, with zero crosslevel on tangents and predetermined crosslevel on curves.

(e) The profile of track being surfaced should not be raised above established grades, except as approved by the MassDOT Rail and Transit Division, who will give consideration to the required elevations and clearances:

  (1) In tunnels; and

  (2) Under overhead bridges/structures; and

  (3) At interlocking plants; and

  (4) Highway grade crossings.

(f) Any encroachment upon the published minimum overhead or side clearances from a track will not be permitted.

  (1) See AREMA, Chapter 28, Table 28-3-3, “Legal Clearance Requirements by State.”

§63.2(M) Maintenance of Track Surface

(a) The following criteria will serve as a practical guide for maintaining smooth riding conditions on existing tracks.

(b) The basic tools for determining correct track surface are the standard track level and stringline. The track level should be checked by the employee inspecting the track prior to use. If found to be incorrect, it must be accurately adjusted or replaced. Other approved devices may be used for determining crosslevel, but their accuracy should be determined by comparison with a standard track level in correct adjustment.

(c) When surfacing or raising track, one rail, which shall be the low rail on curves and usually the line rail on tangents, shall be selected as the grade rail. The other rail must be brought to surface by adjusting the crosslevel as required.

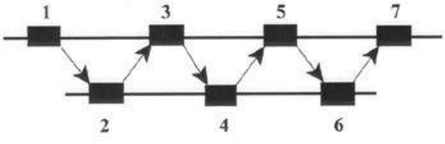
(d) For Track Classes 1-5 track, surface may not deviate more than the amount prescribed in the following table.

Surface Maintenance Limits					
Track Surface	**Class of Track**				
	1	**2**	**3**	**4**	**5**
The runoff in any 31' of rail at the end of a raise may not be more than (inches):	2-5/8	2-1/4	1-1/2	1-1/8	3/4
The deviation from uniform profile on either rail at the mid-ordinate of a 62' chord may not be more than (inches):	2-1/4	2	1-5/8	1-1/2	1
The deviation from zero crosslevel at any point on a tangent or the reverse elevation on curves may not be more than (inches):	2-1/4	1-1/2	1-1/4	1	3/4
The difference in crosslevel between any two points less than 62' apart may not be more than (inches):*(1, 2)	2-1/4	1-1/2	1-1/4	1	3/4
*Where determined by engineering decision prior to June 22, 1998 due to physical restrictions on spiral length and operating practices and experience, the variation in crosslevel on spirals per 31' may not be more than (inches):	2	1-3/4	1-1/4	1	

Notes:

(1) Except as limited by Part I, FRA §213.57(a), where the elevation at any point in a curve equals or exceeds 6", the difference in crosslevel within 62' between that point and a point with greater elevation may not be more than 1-1/2".

(2) However, to control harmonics on Track Classes 2-5 jointed track with staggered joints, the crosslevel differences shall not exceed 1-1/4" in all of six consecutive pairs of joints, as created by seven low joints (see diagram below). Track with joints staggered less than 10' shall not be considered as having staggered joints. Joints within the seven low joints outside of the regular joint spacing shall not be considered as joints for purposes of this footnote.



§63.3(M) Surfacing Areas That Require Special Attention

(a) Special attention must be given to the surface and line of track at the ends and approaches of bridges, crossings, and platforms.

(b) When surfacing, installing or tamping ties, particularly in interlocking plants, care must be taken to avoid breaking or damaging bond wires, pipes, cables or wire connections to the tracks. The Signal Maintainer must be notified prior to any work and all signal appliances are to be marked with high-visibility paint. Notify the Signal Maintainer immediately if damage occurs. Care shall be exercised to avoid the dropping or laying of metal tools or objects across the rails and causing a shunt of the signal circuits.

(c) In hot weather when surfacing track, the requirements of FRA §213.119 and Appendix A, “Continuous Welded Rail (CWR) Procedures” must be followed.

(d) During freezing and thawing weather, attention must be given to the surface of track likely to be affected by heaving due to frost action. Surface irregularities due to frost action that cannot be corrected by usual procedures may be temporarily corrected by use of track shims or by de-icing the ballast. Shimming must be performed in compliance with FRA Part 213 and §129.0(M).

(e) Undercutting, out-of-face track surfacing, and out-of-face tie renewal shall be performed in accordance with Appendix A, “Continuous Welded Rail (CWR) Procedures.”

§63.4(M) Surfacing Track

(a) When track is given a general raise, both rails should be raised at the same time. When track jacks are used, they should be placed opposite each other on the field side of the rail and must not be placed between the rails, except when absolutely necessary.

(b) Surfacing track with automated tamping equipment causes ballast breakdown and, therefore, should only be performed where it is determined to be an effective solution to correct track geometry defects or to raise the track to a required profile. Surfacing work shall be executed in a manner that assures maximum durability of the track raise and the ballast materials.

(c) When track is given a general raise, it is important to consider the relationship between the amount of lift and durability of results. In general, average lifts between 1" to 2" are desirable. Higher raises may be performed, with multiple passes, under the authority of the MassDOT Rail and Transit Division.

(d) Adequate ballast for dressing to the required ballast cross section should be distributed in advance of surfacing and aligning track.

(e) CWR track that has been surfaced and aligned and is being returned to service will be inspected by a qualified person before releasing and in accordance with Appendix A, “Continuous Welded Rail (CWR) Procedures.”

(f) Track should not be raised in interlockings or in signal territory until advance notice has been given to the Signal Maintainer so that switches, or other appliances, can be protected and then re-inspected when the work is completed.

Subpart D - Track Structure and Materials

§100.0(M) MATERIALS

"Track structure" materials include: sub-ballast, ballast, ties, rails, rail fastenings, and other track materials (OTM).

§100.1(M) Handling and Care of Materials

(a) Moving materials from place to place and caring for materials on hand is costly and requires careful planning. Therefore, the amount of material on hand and the number of handlings should be kept to a minimum.

(b) Threaded and/or insulated materials and parts should be kept under cover and protected from the weather.

(c) Materials should be distributed in such a manner so as not to become a tripping hazard or be lost prior to installation in track.

(d) Whenever possible, CWR distributed for installation should be distributed clear of the track.

  (1) When necessary to be placed in the center line of the track, the rail ends should be protected by bending them towards the center line of track (proper nosing).

  (2) When unloaded, CWR should be secured and insulated in such a manner as to prevent shunting of the signal system.

  (3) The top of the CWR, when distributed in the center line of track, should not exceed the height of the running rails.

§100.2(M) Classification of Materials

(a) Materials are classified as follows:

  (1) New: Unused, as manufactured.

  (2) Rehabilitated: Worn materials removed from track and repaired to a relay condition for reuse (e.g., rebuilt frogs).

  (3) Relay: Usable (second-hand) material removed from track to be reused with no required work to be performed before re-installation into track, such as:

    - relay ties,
    - relay rail,
    - relay frogs,
    - relay joints,
    - relay fasteners,
    - relay turnouts, and
    - other special trackwork.

  (4) Scrap: Materials removed from tracks that are not suitable for reuse.

§100.3(M) Removal and Disposition of Materials

(a) Materials removed from track shall be classified as relay or scrap (see §100.2(M)).

(b) Relay materials shall be sorted and stored properly and safely at the Operating Railroad Company's designated MOW materials area for reuse.

(c) Scrap materials shall be disposed of by the Operating Railroad Company in accordance with MassDOT, local, State, and Federal regulations.

(d) Reroller materials are used to fabricate other steel products (see §113.4.1(M)).

(e) Materials shall be removed from the work area as quickly as practicable so as to provide for a clean, safe, right-of-way, and stored securely.

§103.0(M) BALLAST; GENERAL

§103.1(M) Ballast Characteristics

(a) Unless supported by a structure, all track must be supported on a material that will:

  (1) Transmit and distribute the load of the track and railroad rolling equipment to the sub-ballast and then to sub-grade.

  (2) Provide lateral, longitudinal, and vertical restraint for the track.

  (3) Provide drainage for the track structure.

  (4) Facilitate the maintenance of track elevation, crosslevel, surface, and alignment.

(b) Ballast shall conform to the AREMA recommended practice Chapter 1 and Part 2, Section 2.4 to include Tables 2-1 and 2-2. Ballast may be obtained only from MassDOT Rail and Transit Division approved quarries.

(c) When ballast received is of inferior quality, has improper grading, or contains quantities of screenings, dirt, or foreign matter, it shall be rejected and shall be reported to the Track Supervisor, so that corrective action may be taken.

§103.2(M) Ballast Unloading

(a) To the extent practicable, ballast should be unloaded in position for use with a minimum of rehandling and dressing.

(b) Ballast must be distributed and immediately dressed so that adequate clearance below top of rail is provided for the movement of rolling stock and track equipment. Switches are not to be fouled and guard rails are not to be obstructed.

(c) When unloading ballast cars, caution should be used to ensure that both sides of the car are unloaded equally to maintain the stability of the car while unloading.

(d) Use the table given below to determine typical ballast quantities for track panels and special trackwork renewals.

Renewal Type	Number of Ballast Cars
Track Panels (3 each)	1
Crossing Frogs	1
No. 7, 8, 9, 10 Turnouts	2
No. 15 Turnouts	3
No. 20 and 24 Turnouts	4

§103.3(M) Ballast Section

(a) Ballast and sub-ballast cross sections should conform to AREMA, Chapter 1, Section 2.1, “Design,” Figures 1-2-1 through 1-2-4.

(b) Minimum ballast shoulder widths are:

Jointed Rail 12" shoulder	2:1 slope
CWR Rail 12" shoulder	2:1 slope
CWR on curves 16" shoulder	2:1 slope

(c) On CWR track, take remedial action where there is insufficient ballast (see Appendix A, "Continuous Welded Rail Procedures").

§103.4(M) Fouled Ballast

(a) Ballast may consist of crushed slag, crushed stone, screened gravel, pit-run gravel, chat, cinders, scoria, pumice, sand, mine waste, or other native material, and is an integral part of the track structure.

(b) Ballast, regardless of the material, must satisfy all four of the requirements stated in the FRA Track Safety Standards.

(c) The sole appearance of fouled ballast (ballast contaminated with broken down ballast particles, mud, coal dust, or any foreign particles), does not warrant a defect or violation to be written, if the ballast section is properly transmitting the load, restraining the track, providing adequate drainage, and maintaining proper geometry.

(d) However, fouled ballast that is unable to provide adequate drainage is of particular concern because it compromises the ability of ballast to meet its other three functions (i.e., to distribute load, restrain track, and maintain proper geometry).

(e) When fouled ballast with inadequate drainage is present, wheel loads are likely to be concentrated, rather than distributed, causing deterioration of components and instability in the area of the defective ballast.

(f) This deterioration of components and instability increases the risk of track shift (such as a track buckle), and also increases the rate of degradation of geometry, and may result in a derailment.

(g) Factors that affect the rate of degradation of components and geometry include the tonnage, traffic density, and operating speeds, as higher tonnage, traffic density, and operating speeds increase the amount and/or frequency the forces exerted on the components

(h) Operating Railroad MOW personnel should look for indicators that the ballast is not performing its four functions, such as the existence of a crosstie and/or geometry condition.

(1) The term "geometry condition" used here means a track surface, gage, or alignment irregularity that does not exceed the allowable threshold for the designated track class in the Track Safety Standards.

(2) Operating Railroad MOW personnel are encouraged to use their technical knowledge and professional experience in recognizing fouled ballast, and should take into account the severity of a geometry condition along with the following factors when considering the action and/or remedial action required:

- Track class and operating speed
- Traffic density and wheel loads
- Adequacy of shoulder ballast and crib ballast
- Track type: route for passenger and/or hazardous materials
- Potential that the track may deteriorate very rapidly following heavy rains
- Center-bound cross ties, if observable
- Rail and fastener conditions
- Sub-grade condition, if observable
- Surrounding track structure (embankment or cut, obvious/observable variation of track stiffness of the left from right side of the track, and from the adjacent areas along the track)

- Proximity of the defective ballast locations to switches (special work), joints, bridges, or grade crossings
- Existence of standing water or indications that water had been standing (as water sometimes get trapped beneath the ties and may not be visible on the surface)

§103.5(M) Ballast Cleaning

(a) When ballast in track becomes fouled, it should be mechanically cleaned, or removed, and then replaced to restore performance and proper drainage.

(b) The type of cleaning procedure employed should depend on the nature and extent of the fouling.

(c) Types of ballast cleaning and/or removal activities are described below:

  (1) Shoulder ballast cleaning promotes lateral drainage of the track structure. A proper cycle of shoulder cleaning can aid in extending the cycle between undercutting operations.

  (2) Undercutting cleans the ballast under the track to include the ties, cribs, and shoulders.

  (3) A portion of the ballast removed may be returned to the track for reuse if approved by the MassDOT Rail and Transit Division.

  (4) See Appendix A, “Continuous Welded Rail (CWR) Procedures,” for the proper procedures for shoulder cleaning and undercutting of track with CWR.

§103.6(M) Ballast Gradation

(a) The nominal size of crushed stone used for ballast in maintenance and new construction shall be as follows (unless otherwise directed by the MassDOT Rail and Transit Division):

All tracks:

Ballast Size AREMA No. 4	3-4" to 1-1/2"

§109.0(M) CROSSTIES

(a) Crossties shall be made of a material for which rail can be securely fastened. A crosstie must have effective rail fasteners on both the gage and field side of both rails to be considered an effective tie.

(b) Each 39’ segment shall have:

  (1) A sufficient number of cross ties which in combination provide effective support that will:

    (i) Hold gage within limits prescribed in FRA §213.53(b);

    (ii) Maintain service within the surface limits prescribed in FRA §213.63; and

    (iii) Maintain alignment within the limits prescribed in FRA §213.55.

  (2) The minimum number and type of crossties specified in this section must be effectively distributed to support the entire segment; and

  (3) At least one non-defective crosstie of the type specified in this section that is located at a joint.

(4) The minimum number of effective crossties as listed in the table below:

Minimum Number of Effective Crossties			Maximum Distance Between Effective Ties (Center to Center) (Inches)	Maximum Number of Successive Defective Ties (Normal Spacing)
Class of Track	**Tangent Track and Curves ≤ 2°**	**Turnouts and Curve Track > 2°**		
1	5	6	100	3
2	8	9	74	2
3	8	10	74	2
4 and 5	12	14	50	1

§109.1(M) Dimensions of Crossties

(a) Wood crossties are 7" in depth, 9" in width and 8'-6" in length (unless otherwise authorized by the MassDOT Rail and Transit Division).

(b) Timber crossties shall be of the following sizes:

Type of Track	Size
Main Line Track	7" grade (7"x9" x 8'-6")
Other Than Main Track and Yard Tracks	6" grade (6"x8" x 8'x6")
Grade Crossings	7" x 9" x 9', 7" x 9" x 10'(1)
Note: (1) Or as recommended by manufacturer.	

(c) The specifications for wood crossties shall be in accordance with AREMA, Chapter 2.

(d) Wooden transition ties may be used at open deck bridge approaches. Transition tie layout is to be approved by the MassDOT Rail and Transit Division.

(e) Concrete and steel ties may be used with the approval of MassDOT Rail and Transit Division.

(1) Concrete ties shall be sized according to MBTA Standard Plan 1120.

§109.2(M) Use of Crossties

(a) The use of crossties, other than those described in §109.1(M), shall be approved by the MassDOT Rail and Transit Division.

(b) The type and spacing of ties for each line and class of track shall be designated by MassDOT.

(c) The number of ties and tie spacing for each line and class of track shall be designated by the MassDOT Rail and Transit Division in accordance with the service requirements. Center to center tie spacings are given in the table below:

Type of Track	Distance (Inches)
Main Tracks	19-1/2"
Within Grade Crossing(1)	18"
Other Tracks	22"
Concrete Ties	24"
Steel Ties(1)	20"-24"
Note: (1) Or as recommended by the manufacturer.	

(d) It is recognized that ties will not normally be re-spaced except during reconstruction.

(e) However, when ties are installed out-of-face, ties should be re-spaced wherever practicable.

§109.3(M) Placement of Crossties

(a) Wood Crossties
  (1) Ties should be placed in track with the wider heart wood face down and square to the line of the rail.
  (2) The ends of standard 8'-6" ties should be brought to a uniform line 18" from the edge of the base of rail on the line side as follows:
    (i) On single tangent track, line the ties to the mile post side of the track.
    (ii) On roads with two or more main tracks, line the field ends of ties.
    (iii) On all curved track, ties shall be lined to the high rail.
    (iv) When necessary to install non-standard length ties, they shall be centered in the track.

(b) Any Crossties
  (1) Ties shall be kept sufficiently spaced and square to the line of rail to permit proper tamping and distribution of load.
  (2) When necessary, ties should be re-set to standard spacing.
  (3) Ties shall be square to the line of rail so that fastening systems are not subjected to a torsional load because of tie skewing.
  (4) When installed, crossties shall be properly tamped 12" on both sides of the base of rail.

§109.4(M) Preventing Crosstie Damage

(a) General:
  (1) When handling or spacing ties, care shall be taken not to damage them with MOW equipment, picks, and spiking hammers.
  (2) Tie tongs, lining bars and other suitable tools or tie spacing equipment shall be used, so as to prevent tie damage.
  (3) For additional information on fastener application see §127.0(M).

(b) Wood Crossties:
  (1) Adze ties as required to obtain a sound and true bearing to support the tie plate.

(2) If a tie will be reused, cedar tie plugs or an approved hole filler must be used to fill holes where spikes, pins and lag screws have been removed. The tie shall be installed with hole side up.

(3) Square tie plugs (5/8") are used with spikes and pins, round tie plugs (3/4" diameter) are used with lag screws.

§110.0(M) Switch Timber

(a) Timber switch ties shall be 7" grade (7" x 9"), except for power switch machine timbers, which shall be a cross section of 9" x 10", with lengths as shown on the standards plans.

(b) Use of switch timbers of other material must be approved by the MassDOT Rail and Transit Division.

§111.0(M) Bridge Timber

(a) Oak or Southern Yellow Pine Timber, or approved equal by the MassDOT Rail and Transit Division, shall be used on all open deck bridges.

(b) Bridge ties shall be adzed, framed, and sized according to framing plans prior to treatment. Suitable holes must be bored for drive spikes that fasten tie spacing bars on timbers.

(c) Where ties are bored or adzed in the field, they shall be treated with an appropriate preservative.

(d) Bridge ties shall be fastened to the structure with galvanized hook bolts as follows:

- On tangent track every 4th tie shall have two hook bolts to connect the tie to the deck, or
- On curved track every 3rd tie shall have two hook bolts to connect the tie to the deck; or
- The MassDOT Rail and Transit Division shall specify how many ties shall have hook bolts that connect ties to the deck on any and all spans.

(e) Lag screws shall be used in holes bored to size to fasten galvanized tie spacing bars on timber (see MBTA “Standard Book of Plans”).

(f) Tie spacing bar, spacer block, and hook bolt details are given on MBTA Standard Plan No. 1236 “Bridge Timber Anchoring Detail.”

(g) All open deck bridges shall have spacer blocks between all timber (see MBTA “Standard Book of Plans”).

§113.0(M) RAIL

§113.1(M) Branding and Stamping

(a) Branding shall be rolled in raised characters on the side of the web of each rail at a minimum of every 16' in accordance with the following requirements:

(1) The data and order of arrangement of the branding shall be as shown in the following typical brand:

136	RE	Manufacturer	2003	III or 3
(Weight)	(Section)	(Mill Brand)	(Year Rolled)	(Month Rolled)

(2) The method of hydrogen elimination shall be located in the brand when a hydrogen elimination method other than Vacuum Treated (VT) is used.

(b) The web of each rail shall be hot stamped a minimum of three times per rail (short rails must contain a minimum of one full stamp) on the side opposite the brand, and shall not occur within 2' of either end of rails, and in accordance with the following requirements:

(1) The data shall be shown in the following typical stamping. The height of the letters and numerals shall be 5/8".

SS, HH, LA, IH or LH	297165	PSTU	12	BC
(Rail Type)	(Heat Number)	(Rail Letter)	(Strand and Bloom Number)	(Method of Hydrogen Elimination, if indicated in stamping)

Notes:
SS = Standard Strength
HH = Head-Hardened
LA = Low Alley Standard Strength
IH = Low Alloy Intermediate
LH = Low Alloy Head-Hardened

(2) Rails from continuous cast blooms shall be identified by a designation for heat number, strand number, and bloom number. The rail shall be identified by an alphabetical designation beginning with “P”, and succeeding “S”, “T”, “U”, etc., consecutively, or any other identification of the position of the rail within the cast, as agreed between the purchaser and manufacturer.

(c) Markings:

(1) High-strength rails shall be marked by either a metal plate permanently attached to the neutral axis, hot stamped, or in the brand which gives the manufacturer, type, and/or method of treatment. Heat-treated rail shall be paint-marked orange. Alloy rail shall be paint-marked aluminum color.

(2) Non-AREMA (Industrial Quality) rails shall be paint-marked yellow.

(3) Short rails (less than 80') shall be paint-marked green.

(4) Trackwork rails shall be paint-marked white.

(5) Rail length shall be painted on the end faces or in a manner acceptable to the purchaser or manufacturer.

(6) Individual rails shall be paint-marked only one color, according to the order listed above.

(7) Industrial Quality (IQ) rails shall be permanently identified by grinding diagonally through every “RE” or other designation within the rails’ branding. Each designation brand shall be ground or milled diagonally from the top right hand corner to the bottom left hand corner, a minimum of 1/4" in width and to within 0.010" of the parent rail web surface.

(d) For further information on this subject see AREMA 2.1.6.

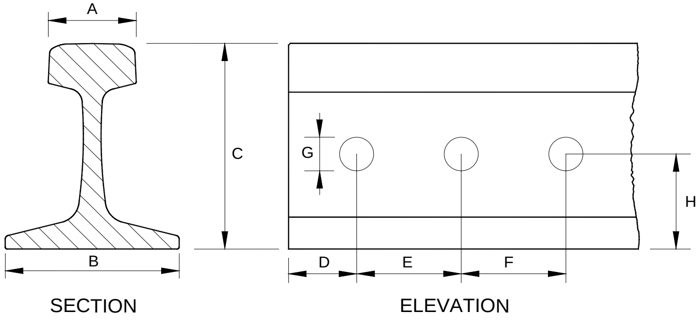
§113.2(M) Rail End Drilling and Bolt Hole Sizes

(a) Jointed rails consist of conventional length rails of 400' or less which are bolted together.

(b) CWR is continuous welded rail in strings of greater than 400' where the rails are welded by the flash butt process or by other methods as approved by MassDOT.

(c) Rail size dimensions and bolt hole drilling for typical rail sections are given in the following table.

(d) A rail and joint dimension table with some typical MassDOT rail sections is contained below.



RAIL DATA

Rail Data
(Inches)

Rail Section Dimensions In Inches	**80# A.S.**	**85# A.S.**	**100# NH**	**105# DY**	**107# NH**	**112# R.E.**	**115# R.E.**	**119# R.E.**	**130# R.E.**	**131# R.E.**	**132# R.E.**	**136# R.E.**	**140# R.E.**	**141# R.E.**
A - Head Width	2-1/2	2-9/16	2-3/4	3	2-3/4	2-23/32	2-23/32	2-21/32	2-15/16	3	3	2-15/16	3	3-1/16
B - Base Width	5	5-3/16	5-1/2	5-1/2	5-1/2	5-1/2	5-1/2	5-1/2	6	7	6	6	6	6
C - Height	5	5-3/16	6	6	6-1/8	6-5/8	6-5/8	6-13/16	6-3/4	7-1/8	7-1/8	7-5/16	7-5/16	7-7/16
D - Drilling (1st Hole)	1-15/16	1-15/16	2-1/2	2-3/4	2-1/2	2-7/16	3-1/2	3-1/2	2-3/8	2-1/2	3-1/2	3-1/2	3-12	3-1/2
E - Drilling (2nd Hole)	7	7	7	5-5/8	7	7	6	6	7	6-1/2	6	6	6	6
F - Drilling (3rd Hole)	-	-	-	5-5/8	-	6	6	6	NA	6-1/2	6	6	6	6
G - Diameter of Bolt Hole	1	1	1	1-1/16	1	1-1/8	1-1/8	1-1/8	1-11/32	1-1/8	1-1/4	1-1/4	1-1/4	1-1/4
H - Base to Center of Hole	2-3/16	2-9/32	2-39/64	2-5/8	2-39/64	2-7/8	2-7/8	2-7/8	2-3/4	3-3/32	3-3/32	3-3/32	3	3-3/32
I - Diam. of Bolt	7/8	7/8	7/8	15/16	7/8	1	1	1	1-1/8	1	1-1/8	1-1/8	1-1/8	1-1/8

Note:

[1] Source: AREMA Plan Nos. 4-1-6, 4-1-7, 4-3-13

§113.3(M) Recommended Maintenance Wear Limits for Rail

§113.3.1(M) Maximum Head and Gage Face Wear for Rail (In and Out of Track)

(a) With traffic, the rail head wears vertically and horizontally. As this wear increases, the cross section of the rail decreases. This decrease in rail section may overstress the rail causing rail failure.

(b) The following table contains the maintenance wear limits for maximum vertical wear and maximum gage face wear (both gage and field) for rail sections commonly found on MassDOT rail lines.

(c) Rail that has head and gage face wear, as given in the table below, shall be immediately removed from track and scrapped as soon as practicable.

(d) Rail replacement should be programmed prior to reaching the given maintenance rail wear limits.

§113.3.2(M) Railway Limits for the Welding of Relay Rail

(a) The table below gives the maximum head wear and gage face wear values recommended by AREMA for the welding of relay rail.

(b) Relay rail that has greater amounts of either head wear and/or gage face wear should not be welded.

(c) Maximum wear values are given for both mainlines and for other tracks to include light density mainlines, sidings, and other tracks.

Recommended Maintenance Maximum Rail Wear Limits (1)

Rail Section	New Rail Height (Inches)	Allowable Head Wear (Inches)			Allowable Gage Face Wear (Inches)		
		Mainlines	Other Tracks	New Rail Head Width(2) (Inches)	Mainlines	Other Tracks	Total Head Width Wear(3) for Mainlines and Other Tracks
80 AS	5	5/16	3/8	2-1/2	5/16	3/8	1/2
85 AS	6	3/8	7/16	2-9/16	5/16	3/8	1/2
100 NH	6	1/2	5/8	2-3/4	3/8	1/2	1/2
105 DY	6	1/2	5/8	3	3/8	5/8	1/2
107 NH	6-1/8	1/2	5/8	2-3/4	3/8	1/2	1/2
112 RE	6-5/8	1/2	5/8	2-23/32	3/8	1/2	1/2
115 RE	6-5/8	1/2	5/8	2-23/32	3/8	1/2	1/2
119 RE	6-13/16	1/2	5/8	2-21/32	3/8	5/8	1/2
130 RE	6-3/4	1/2	5/8	2-15/16	3/8	3/4	3/4
131 RE	7-1/8	5/8	1/2	3	1/2	3/4	3/4
132 RE	7-1/8	5/8	1/2	3	1/2	3/4	3/4
136 RE	7-5/16	5/8	3/4	2-15/16	1/2	3/4	3/4
140 RE	7-5/16	5/8	3/4	3	1/2	3/4	3/4
141 RE	7-7/16	5/8	3/4	3-1/16	1/2	3/4	3/4

Notes:

(1) Rail that has maximum wear as given in this table shall be removed from track immediately and scrapped as soon as practicable.
(2) Measure gage face wear at 5/8" below top of crown of railhead.
(3) Combine field and gage side wear 5/8" below top of crown of railhead. This wear column only applies to rail that has been transposed.

Rail Wear Limits for the Welding of Relay Rail(5)

Rail Section	New Rail Height (Inches)	Maximum Allowable Head Wear (Inches)			Maximum Allowable Gage Face Wear(1) (Inches)		
		Mainlines/ AREMA Class 2	Other Tracks/ AREMA Class 3	New Rail Head Width(2) (Inches)	Mainlines/ AREMA One Side Class 2	Other Tracks/ AREMA One Side Class 3	Total Head Width Wear(3)/ AREMA Both Sides Classes 2 and 3
80 AS	5	N/A	N/A	2-1/2	N/A	N/A	N/A
85 AS	6	N/A	N/A	2-9/16	N/A	N/A	N/A
100 NH	6	1/8(4)	N/A	2-3/4	3/16(4)	N/A	3/16(4)
105 DY	6	1/8(4)	N/A	3	3/16(4)	N/A	3/16(4)
107 NH	6-1/8	1/8(4)	N/A	2-3/4	3/16(4)	N/A	3/16(4)
112 RE	6-5/8	1/4(4)	3/8(4)	2-23/32	3/16(4)	5/16(4)	3/16(4)
115 RE	6-5/8	1/4(4)	3/8(4)	2-23/32	3/16(4)	5/16(4)	3/16(4)
119 RE	6-13/16	1/4(4)	3/8(4)	2-21/32	3/16(4)	5/16(4)	3/16(4)
130 RE	6-3/4	N/A	N/A	2-15/16	N/A	N/A	N/A
131 RE	7-1/8	1/4(4)	1/2(4)	3	1/4(4)	3/8(4)	3/16(4)
132 RE	7-1/8	5/16(4)	9/16(4)	3	1/4(4)	3/8(4)	3/16(4)
136 RE	7-5/16	5/16(4)	9/16(4)	2-15/16	1/4(4)	3/8(4)	3/16(4)
140 RE	7-5/16(4)	5/16(4)	9/16(4)	3(4)	1/4(4)	3/8(4)	3/16(4)
141 RE	7-7/16(4)	3/8(4)	5/8(4)	3-1/16(4)	1/4(4)	3/8(4)	3/16(4)

Notes:

(1) Measure gage face wear at 5/8" below top of crown of railhead.
(2) Combine field and gage side wear 5/8" below top of crown of railhead. This wear column only applies to rail that has been transposed.
(3) Rail classified as AREMA Class 1 or 2 may be used in any track without restriction.
(4) Rail classified as AREMA Class 3 may be used in light density mainlines, sidings, and all other tracks.
(5) AREMA values from “Rail Grading Classification by Wear Table 4-3-17.”

§113.3.3(M) Classification and Identification of Rail for Reuse (In and Out of Track)

(a) By mill inspection, rails are to be classified and identified by paint marking as follows:

Type of Rail	Marking
Standard Carbon Rails	None
Head-Hardened Rails	Orange
Rails not 39 ft. or 80 ft. in length	Green
Relay Rail Pre-Tested	Green
Relay Rail Not Tested	Yellow
Industrial Quality Rail	Per Mill

(1) High-strength rails shall be marked by either a metal plate permanently attached to the neutral axis, hot stamped, or in the brand. The information will include the manufacturer and type and/or method of treatment. (Fully heat-treated rails are no longer available and are not to be used unless approved by MassDOT Rail and Transit Division.)

(2) Individual rails shall be paint-marked only one color according to the above, or as agreed to by MassDOT Rail and Transit Division and the manufacturer.

(3) Paint marking will appear on the top of the head of one end of the rail only, at least 3' from the end.

(4) All short length rails produced shall have the length identified in a manner acceptable to MassDOT Rail and Transit Division and the manufacturer on top of the head of the rail approximately 1' from each end.

(b) Failed Rails:

(1) Rails removed from track on account of any defects listed in FRA §213.113(a), except end defects described in Paragraph (2) below, must have the top of the head noticeably damaged at the defect using a cutting torch or abrasive saw, so that they will not be mistakenly returned to service in track, or be butt welded in fabricating strings of fit CWR. These rails will also be marked with red paint on the running surface near the ends of the rail. Such failed rails, damaged as above, are to be classified for scrap in its proper category.

(2) Rails removed from track on account of end defects only, such as a bolt hole crack or head-web separation where a portion of the rail end is not physically broken out, must have the top of the rail head noticeably damaged at the location of the defect using a cutting torch or abrasive saw to insure that a rail of this type is not returned to service in track without cropping the defective end.

(3) Any rail containing longitudinal or transverse defects must be removed in its entirety (all rail between joints in bolted rail, and all rail between plant welds, between plant and field welds, or between field welds in CWR). These rails will also be marked with red paint on the running surface near the ends of the rail. The entire rail is then to be considered as scrap rail. Rails removed from track on account of any defects listed in FRA §213.113(a), except end defects described in Paragraph (2) above, must have the top of the head noticeably damaged at the defect using a cutting torch or abrasive saw, so that they will not be mistakenly returned to service in track, or be butt welded in fabricating strings of fit CWR.

§113.3.4(M) Transposing and Turning Rail on Curves

(a) To obtain the maximum service life of rails on curves, the high and low sides should be transposed before horizontal wear, vertical wear or flow of metal in the head makes this impractical because of undesirable rail head stresses that may be produced leading to possible failure of the rail itself.

(b) In general, high and low sides should be transposed when the horizontal wear on the high rail is between 3/8" and 5/8" in the full body of the curve, and before the metal in the low rail flows excessively.

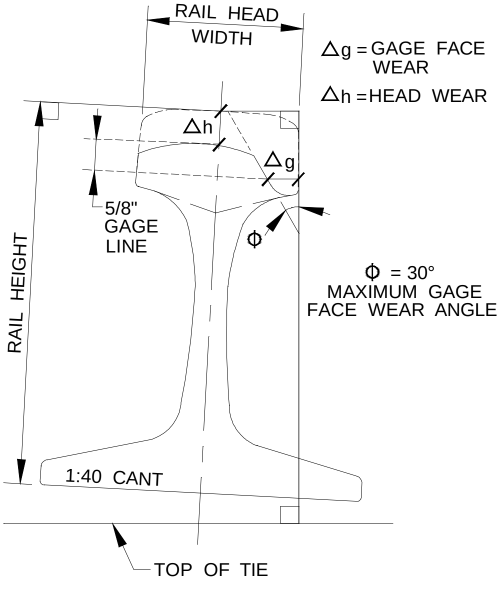
(c) In general, high side rails may be turned when horizontal wear does not exceed 1/2".

(d) 112 lb. and 131 lb. rail must not be turned or transposed without the permission of the MassDOT Rail and Transit Division.

§113.3.5(M) Gage Face Angle (Worn Rail)

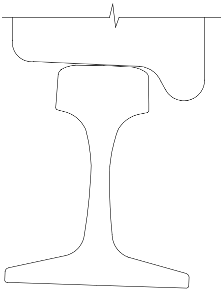
(a) When a rail is placed in track, under traffic, the gage face wears at an angle (ϕ). As this angle increases, the possibility for a wheel to climb the gage face of a rail and derail increases.

(b) As shown on the following diagram, rail replacement shall be accomplished when the gage face angle (ϕ) exceeds 30°. As the rail wear readings approach 30°, the Operating Railroad Company should make necessary plans to change out the rail.



RAIL WEAR CRITERIA

(c) For an example of new wheel and new rail interface, see the following diagram.



§113.4(M) Rail Classifications

§113.4.1(M) Defective Rails

(a) Rails removed from track on account of any defects listed in FRA §213.113(a), except end defects described in Paragraph (c) below, must be marked “NG” (no good) and a torch mark made in the head of the rail.

(b) Rails removed from track with end defects, such as bolt hole cracks or head-web separations where a portion of the rail end is not physically broken out, must have the top of the rail head noticeably damaged at the location of the defect, using a cutting torch or power saw to insure that a rail of this type is not returned to service without cropping off the defective end.

(c) “Reroller Rails/Rail Steel No. 1” are rail steel materials that are recycled as used to fabricate other steel products to include bars and shapes. Reroller rail generally has a higher value than rail scrap. Reroller rail includes:

- Standard section tee rails with a weight of 50 lbs/yard or greater which are free of all attachments;
- Rails that have no excessive pitting;
- Rails that are free of all debris (e.g., concrete, mud, asphalt, etc.);
- Rails that are not bent and twisted;
- Ferrous materials that do not contain frogs, switches and guard rails;
- Rails that do not have split heads and broken flanges;
- Pieces of CWR, provided no weld is over 9" from the end of the rail; or
- As specified by the Institute of Scrap Recycling Industries.

(d) Defective rails should be immediately removed from the right-of-way to the approved MassDOT secured scrap material storage area.

§113.4.2(M) New Rails

Class of Rail	Use
Medium-Hard Rail* Standard Rail (HB310)	In all tracks.
Head-Hardened Rail	For curves 3º and over, mainline turnouts, grade crossings, special trackwork, tunnels, and other locations as specified by the MassDOT Rail and Transit Division.

Notes:

* Standard Rail - standard rail that conforms to latest AREMA Specifications.

* Head-Hardened Rail - prime rail that is fully quenched and tempered in the head area only to increase hardness and strength. Head-hardened rail rolled by PST (Bethlehem Steel Company) will be marked “HH” to the right of the heat number. Head-hardened rail rolled by Rocky Mountain Steel Mill (CF&I Company) will be marked “DH” to the right of the heat number.

* Head-hardened markings furnished by any other manufacturers shall be approved by the MassDOT Rail and Transit Division.

§113.4.3(M) Cropped or Relay Rails

(a) Rails removed from track having only end defects, such as bolt hole cracks or head-web separations within joint bar areas, may be used without restrictions after defects have been eliminated by cropping (see §113.11(M)).

(b) Relay rail should be checked against the rail wear table given in §113.2.1(M) prior to installation.

(c) Any relay rail installed in main track that carries passenger trains, or is a hazardous material route, shall be inspected for internal rail defects if the operating speed is Class 3 or higher.

(d) If a valid search for internal defects cannot be conducted before expiration of time or tonnage limits given in FRA §213.237(a) or (c), reduce operating speed to a maximum 25 MPH until such time as the valid search can be made.

§113.5(M) Disposition and Shipment of Rails

(a) Rails released from renewals and retirements must be disposed of as authorized by MassDOT.

(b) Other track materials (OTM) must be removed from the individual rails before loading rail onto railcars or trucks (see §100.3(M)).

(c) For shipment, relay rails may be loaded head up with wood stripping between layers.

§113.6(M) Distributing Rail

(a) Rails and OTMs should be unloaded in a position as close as possible for laying to minimize further handling.

(b) Rails should be placed parallel with the track on their base to avoid excessive bending or damage. Care should be taken to avoid placing rails on manhole covers, on signal cables and conduits, or close to air lines.

(c) Rail is not to be stored between the running rails unless conditions do not allow rail placement outside the track off the ends of the ties. Rail heads should not be above the running rail.

(d) CWR ends must be offset and blocked to allow for thermal expansion.

(e) In yards and at locations where employees must walk close to the track, rail should be placed as near to the ends of ties as possible to avoid obstructing walkways.

(f) Any time rail and OTM is distributed along the right-of-way, the Transportation Department must be notified so as to include in a Division Notice.

§113.7(M) Preparation and Care

(a) As far as practicable, track should be placed in good line and surface prior to rail renewals. Programmed tie renewal shall be accomplished before laying rail. Track to be laid with CWR should be fully ballasted, and preferably, programmed tie renewals should be completed in advance of rail laying.

(b) Rails should be examined prior to laying in track to detect any sharp bends, damage, or surface conditions that will make them unserviceable.

(c) Care of rail should be taken the day on which it is laid, so that no damage to rail or fastenings will result from continued use under normal traffic. Loose ties should be tamped to a good bearing under the rail immediately behind rail laying operations.

§113.8(M) Laying Jointed Rails

(a) Jointed rails should be laid, one at a time, with space allowance for expansion being provided between rail ends in accordance with the following table:

Jointed Rail Expansion Tables

39' Rails

Rail Temperature (°F)	Rail End Space (Inches)
Below 6	5/16
6 to 25	1/4
26 to 45	3/16
46 to 65	1/8
66 to 85	1/16
Over 85	None

78' or 80' Rails

Rail Temperature (°F)	Rail End Space (Inches)
Below 30	5/16
31 to 45	1/4
46 to 60	3/16
61 to 72	1/8
73 to 85	1/16
Over 85	None

(b) Rails greater than 80' and less than 400' in length, must be expanded and anchored as CWR.

(c) To insure the required space allowance, rail ends should be brought squarely together against approved expansion shims of proper thickness and the rail joints applied before spiking and anchoring.

(d) Space between rail ends for insulating joints (paper and poly types) should only be sufficient to permit insertion of standard end posts.

(e) An approved rail thermometer shall be used. The person in charge shall see that rail temperature is checked frequently and that proper rail expansion shims are used.

(f) Jointed rails should be laid, one at a time, with space allowance for expansion being provided between rail ends.

(g) To insure the space allowance required, rail ends should be brought squarely together against approved expansion shims of proper thickness and the rail joints bolted before spiking.

(h) An exception to the requirement of laying one rail at a time is to expedite rail installation no more than 180' of rail (5 @ 39' rails) may be bolted together prior to being installed in track, provided that the proper rail end spaces are maintained according to §113.9(a) above.

(i) Space between rail ends in insulated joints should only be sufficient to permit installation of standard end posts.

(j) An approved magnetic rail thermometer shall be used to determine the rail temperature. The thermometer is to be attached to the web of the rail that is shaded from the sun's rays for a minimum of 5 minutes until an accurate temperature reading can be achieved. Rail thermometer should be placed on the smooth surface of the web and not on any raised brand.

(k) Rail should be laid with joints staggered 13' to 15'. Permissible variations are as follows:

  (1) Through turnouts and at insulated joints;

  (2) Rails laid with the joints of one line of rail opposite the middle of rails in the other line in accordance with former standards need not be relocated until out-of-face rail renewals are made; and

  (3) At other locations as directed by the MassDOT Rail and Transit Division.

(l) Rails less than 18' in length should not be used in main tracks, except that rails not less than 14' may be used for:

  (1) Connections within turnouts and crossovers;

  (2) Temporary closures;

  (3) Temporary replacement of broken rails. Rails not less than 14' in length used in accordance with previous standard practice need not be removed until rails are changed or re-laid.

(m) Placing bolted joints in or closer than 30' from the edges of road crossings, within the limits of switch rails, frog guard rails, or the ends of open deck bridges, trestles, or viaducts is prohibited (unless approved by MassDOT Rail and Transit Division).

(n) Rails of the same section should be used on open deck bridges, through road crossings, through paved track areas of station platforms, through areas of direct fixation track, and to the greatest extent possible in turnouts and crossovers.

(o) Rails of unequal wear and different sections must be brought to an even surface at joints on the tread and gage side of the rail by welding. When shimming is required to run off the difference in height of rails, the requirements of §129.0(M) must be met.

(p) The use of shims or spring washers between the web and the joint bar to align the gage sides of rail heads, or the use of acetylene torches, or grinding to manufacture, or change the dimensions of compromise joints, is prohibited. Adjustments to the tread and gage side of the rail head must be accomplished by:

  (1) Compromise joints of approved design.

  (2) By welding the rail head.

(q) When necessary to make a temporary connection for the passage of a train at normal speed, the connection must be made with a piece of rail not less than 14' long. Use compromise or standard joints with the full number of bolts and with all rail holding spikes driven. Use of switch points to make temporary connections when laying rail is prohibited.

§113.9(M) Rail End Bolt Holes

(a) Holes must be drilled in accordance with AREMA recommended standard practice and the following:

  (1) Bolt holes shall be drilled with the joint bars removed by marking the location of the center of the hole with a proper size template block or by drilling through an approved template.

  (2) When bolt holes are drilled, a uniform feeding pressure should be maintained as per manufacturer's instructions.

  (3) An environmentally sensitive lubricant should be used throughout the drilling process.

  (4) Bolt hole sizes and drillings are found in the rail end drilling table given in §113.1(M).

  (5) After drilling is completed, bolt holes should be brushed out and inspected. Any burrs or chipped edges should be removed by chamfering or filing to a smooth edge around the entire circumference of the bolt hole.

  (6) If jointed rail is to be welded, rail ends should be drilled in such a manner as to provide for closure by field welding (no edge of hole closer than 6" to the joint).

  (7) In those instances where the joint will not be welded, all holes in the joint bar will be drilled and fully bolted.

§113.10(M) Cutting and Electric Arc Welding of Rail

(a) For cutting of tight rails in CWR see Appendix A, "Continuous Welded Rail (CWR) Procedures."

(b) The tools which may be used for cutting rails are listed below:

  (1) Power saws with approved guide attachments and proper PPE.

  (2) Gas cutting torches, in emergency only in accordance with FRA §213.122.

(c) Electric arc welding is prohibited on any portion of the rail, except as listed below:

  (1) Welding of engine burns. Engine burns deeper than 3/8" should not be welded. If there are more than four engine burns within a 39' rail, the rail should be changed out.

  (2) Application of welded bonds.

  (3) Top of rail within limits of joint bars (batter and rail ends).

  (4) Gas welding of rail is prohibited.

(d) Any rail damaged by torches must be promptly removed from track.

(e) Except for the welding of engine burns in accordance with approved methods, and except for application of welded bonds, gas or electric arc welding is permitted only on the top of the rail within the limits of the joint bars.

§113.11(M) Bonding Rails for Track Circuits

(a) Except in an emergency where rails are bonded for track circuits, no rail bonds shall be broken or rails removed unless a Signal Maintainer is notified or present.

(b) Signal bonds shall not be applied to the rail web or base; only on the rail head.

(c) In an emergency, a broken rail, switch point, or frog may be renewed without waiting for the Signal Maintainer. In such cases, the joints shall be tightened to make as good contact as possible with the rails and the Signal Maintainer notified that the rail bonds have been broken.

(d) If a broken rail is replaced within the starting circuit of automatic highway crossing protection, the track shall not be restored to service until all trains approaching the crossing have been:

  (1) Instructed to be prepared to stop prior to passing over the crossing involved; or

  (2) Until a qualified person under FRA §213.7(d)(1) is provided to move train traffic at the crossing; or

  (3) The Signal Maintainer has applied all rail bonds and verified the continuity of the circuit.

§113.12(M) Maintenance of Rail by Grinding

(a) Rail grinding must be accomplished with profile grinders or production grinding units.

  (1) Hand grinding should be limited to small areas where the use of profile grinders is not practical.

  (2) Out-of-face grinding must be performed with production grinding units.

(b) Production grinding is required to remove surface anomalies such as scale, flakes, checks, shells, and corrugations on the rail head and to re-profile the rail head.

(c) In special trackwork a combination of production grinding and hand grinding may be required.

(d) Grinding of rail should be performed at regular intervals based on the condition of the rail, location (such as grades and curves), the number, and type of trains, and the accumulated tonnage at a particular location.

(e) All grinding on wooden open deck bridges shall be approved by MassDOT Rail and Transit Division before any work begins. Rail grinding on bridges (ballast deck) is permitted provided that proper precaution is taken against fire as given below:

  (1) Grinding shall only be performed when there is no highway or river traffic directly under the area to be ground.

  (2) The rail grinding crew has a supply of water and other fire suppressants to protect against fire.

  (3) After grinding, the entire structure is re-inspected for possible “hot spots” or fire.

  (4) Production grinding of rail on timber trestles is prohibited.

(f) High rail truck with water tank shall follow rail grinder to inspect for hot spots and slag.

(g) MassDOT Rail and Transit Division shall approve lubricants and/or friction modifiers to be used after grinding curves on:

  (1) Gage face on the high rail

  (2) Top of rail (TOR) on the low rail.

§113.13(M) Repair of Welds and Rail Head Depressions by Welding or Grinding

(a) Field and shop welds shall be inspected for batter. Maintenance welding and grinding shall be performed as required.

(b) The depth of low spots and depressions around welds shall be measured with a 36" straight edge and taper gauge. Maintenance welding and grinding shall be performed as required.

(c) The preferred method of removing low spots, low areas, and engine burns (but NOT engine burn fractures), in the rail head profile is by building up the rail head by welding.

(d) Any engine burn should be repaired as soon as practicable before rail and tie damage occur. Engine burns 3/8" or greater require removal and replacement of the rail.

§113.13.1(M) Cross Cutting (Slotting) of Bolted Joints

(a) Permanent bolted joints shall be inspected and rail ends slotted as required to remove metal flow and prevent end chipping.

(b) When rails are replaced at the location of a permanently bolted joint, the rail ends should be slotted.

(c) The frequency of grinding or slotting rail ends at permanently bolted joint locations may increase due to traffic and as other local conditions require.

§113.14(M) Passing Trains Over Broken Rails and/or Pull-Aparts

(a) When passing trains and/or locomotives over broken rails and/or pull-aparts, the Operating Railroad Company MOW personnel shall comply with the following information.

(b) Persons not fully qualified to supervise certain renewals and inspect track as required in Paragraph (a) of this section, but with at least one year of MOW or signal experience, may pass trains over broken rails and pull-aparts provided that:

  (1) The track owner determines the person to be qualified and, as part of doing so, trains, examines, and re-examines the person periodically within two years after each prior examination on the following topics as they relate to the safe passage of trains over broken rails or pull-aparts: rail defect identification, crosstie condition, track surface and alignment, gage restraint, rail end mismatch, joint bars, and maximum distance between rail ends over which trains may be allowed to pass. The sole purpose of the examination is to ascertain the person's ability to effectively apply these requirements and the examination may not be used to disqualify the person from other duties. A minimum of four hours training is required for initial training;

  (2) The person deems it safe and train speeds are limited to a maximum of 10 MPH over the broken rail or pull apart;

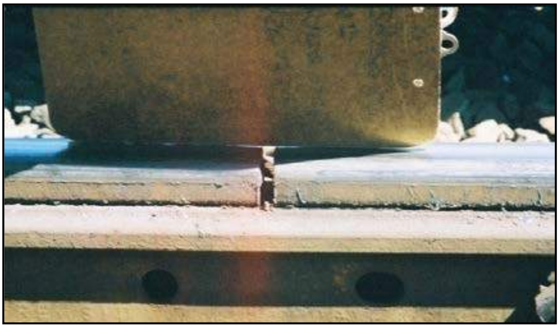
  (3) The person shall watch all movements over the broken rail or pull apart and be prepared to stop the train if necessary; and

  (4) Person(s) fully qualified under FRA §213.7 are notified and dispatched to the location promptly for the purpose of authorizing movements and effecting temporary or permanent repairs.

§115.0(M) RAIL END MISMATCH

Rail shall be maintained so that the mismatch of rails at joints may not be more than that prescribed in the following table:

Rail End Mismatch Maintenance Limits		
Class of Track	**Any mismatch of rails at joints may not be more than the following:**	
	On the head of the rail ends (Inches)	**On the gage side of the rail ends (Inches)**
1 – 5	1/8	1/8



Rail End Mismatch

§117.0(M) RAIL END BATTER/BEVELING OF RAIL ENDS

(a) Rail end batter is the depth of depression in the rail head near the end of the rail. It is measured by placing an 18" straight edge on the head of the rail at the rail end, without bridging the joint and measuring with a taper gauge the maximum distance between the bottom of the straight edge and the top of the rail head.

(b) When rail end batter is detected, it should be monitored and corrected when reaching the limits given below:

(1) See the following table:

Rail End Batter Maintenance Limits		
Class of Track	**Rail End Batter May Not Be More Than (Inches):**	**Crop Bolt Holes and Rail Ends to Remove Batter if Batter Exceeds Values Below (Inches):**
1 - 2	1/4	3/8
3 – 5	1/8	1/4

(2) Rail end batter should be repaired by a qualified welder using an electric arc welder.

(3) In Classes 3-5, rail ends that have 3/8" or more rail batter shall not be welded and shall be cut out and scrapped.

(4) After welding, rail ends shall be ground and slotted as shown in Paragraph (c).

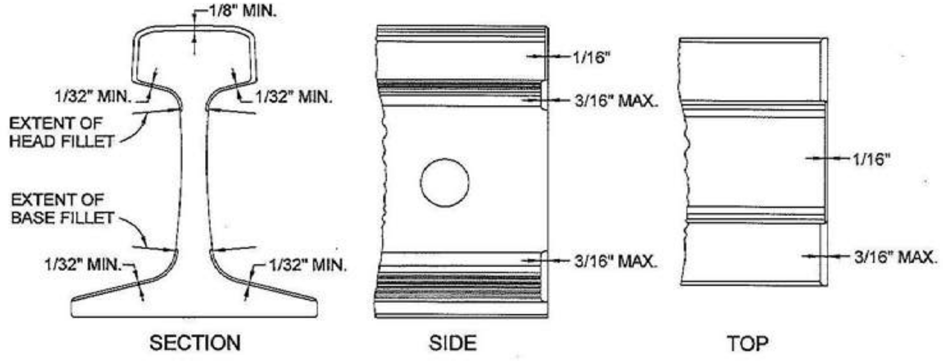
(c) To reduce chipping or spalling due to overflow of steel under traffic, the rail end faces should be cross-cut by grinding with a 1/8" beveled slotting wheel to a depth of not less than 3/16" below the surface of the head.

(1) The maximum cut should not be wider than 1/8".

(2) If the rails are not in contact, the overflowed metal should be removed from both end faces by grinding 1/16" from the ends of both rails.

(3) See following figure as developed by AREMA.

THE HEEL ENDS OF SWITCH RAILS, THE ENDS OF THE ARMS OF TURNOUT AND CROSSING FROGS, THE ENDS OF CLOSURE RAILS WITHIN CROSSINGS OR OTHER SPECIAL TRACKWORK LAYOUTS, AND THE ANALOGOUS PORTION OF THE ENDS OF SOLID MANGANESE FROGS AND CROSSINGS SHALL BE BEVELED AS SHOWN ON THIS PLAN.



BEVELING OF RAIL ENDS FOR TRACKWORK

§118.0(M) RAIL LUBRICATION

(a) The gage face of the running rail in track or in special trackwork must be lubricated as follows:

  (1) Running rail in curve locations where there is significant gage face wear on the high rail, or significant flow on the low rail, shall be lubricated with a wayside lubricator or as specified by the MassDOT Rail and Transit Division.

    (i) Lubricate high rail gage face

    (ii) Lubricate low rail top of rail

  (2) When changing switch points, stock rails, and frogs in heavily used routes in interlockings, regardless of turnout size or type, lubricate new components by hand.

  (3) After grinding or welding repairs to switch points and/or frogs, lubricate components by hand.

  (4) When production grinding, ensure that in curves both rails are lubricated on the last grinding pass.

(b) When lubricating rail, care should be taken to control the amount of lubricant being used to avoid migration to the running surface of the rail.

(c) At wayside lubricator locations, install geotech fabric to prevent fouling of ballast. Dispose of fabric in accordance with local, State, and Federal regulations.

(d) Locate lubricators no closer than 500' from grade crossings with active warning devices.

(e) When installing lubricators, care should be taken not to install steel-mesh hoses in signal territory.

(f) Both rails should be lubricated as excessive lubrication of the high rail and poor lubrication of the low rail can produce high lateral forces and low rail rollover resulting in derailment.

(g) Use only approved environmentally-friendly lubricants per manufacturer’s recommendations.

§119.0(M) CONTINUOUS WELDED RAIL PROCEDURES

See Appendix A, “Continuous Welded Rail (CWR) Procedures.”

§121.0(M) RAIL JOINTS

§121.1(M) Field Welding of Rail Joints

(a) When performing rail maintenance, reduce the quantity of joints in track by laying CWR and field welding joints wherever possible.

(b) Thermite and flash butt are acceptable methods for in-track field welding.

(c) Thermite and flash butt welding shall be performed in accordance with the supplier’s recommended procedure.

(d) When it is necessary to install plug rails, the plug rails should be at least 13' in length.

(e) Bonded insulated joint rail assemblies shall be field welded.

(f) Whenever possible it is desirable to field weld all turnouts and special trackwork.

(g) If it becomes necessary to apply temporary joint bars in CWR, the end bolt hole in each rail must not be drilled, as this would prevent subsequent field welding. Additional rail anchors must be applied to this joint in accordance with §125.0(M).

(h) Field welding on open deck bridges is permitted provided that proper precaution against fire is taken and only allowed with the prior approval of MassDOT Rail and Transit Division.

§121.1.1(M) Thermite Field Welding

(a) When using the thermite field welding process:

- (1) Ensure that rail ends are secured against movement from thermal expansion or contraction, or from other causes. Use a hydraulic expander to maintain the rail end gap and rail alignment.
- (2) Saw cut rail ends to be welded. If a torch cut rail is to be welded at least 2" of rail behind the torch cut must be cut off with a saw before the weld is made.
- (3) No thermite weld shall be made:
  - (i) If the air temperature is below 32°F.
  - (ii) In inclement weather (rain or snow).
- (4) Required location of field welds:
  - (i) Within 14' of a field weld in the same rail.
  - (ii) Within 4' of a plant weld in the same rail.
  - (iii) Within 10' of the centerline of any joint (except bonded insulated joints where no weld shall be made within 7' of the centerline of the joint).
  - (iv) Within 6" of a bolt hole.
  - (v) Within 6" of a weld that has been cut out.
  - (vi) On or within 4-1/2" of a tie plate or concrete tie rail seat.
  - (vii) Within a grade crossing without the permission of MassDOT Rail and Transit Division.
- (5) General welding procedures are as follows:
  - (i) Prior to installing the molds, make a visual inspection of the two rail ends to ensure there are no bent rails or other defects such as cracks, splits, pipes, etc., which could cause, or later be interpreted as a defective weld.
  - (ii) Check the gap to ensure that it meets the specification of the weld kit manufacturer.
  - (iii) Align the rail ends.
  - (iv) Remove foreign matter, luting compound, and/or moisture from the molds or crucible.
  - (v) If a hydraulic expander has been used, do not release it until the weld has cooled to 500°F or less. The expander shall be released gradually.
  - (vi) No train traffic shall be allowed to pass over the weld, nor shall there be any disturbance of the track or rail in the area of the weld, until the weld has cooled to 500°F or less.
- (6) The grinding and finishing of the weldment are as follows:
  - (i) The top and sides of the head of the rail at the weld shall be ground flush with the parent metal.
  - (ii) The weld in the web and base should be ground ***only*** to remove notches created by offset conditions, sharp protrusions, and gouges. These should be blended into the contour of the weld collar to eliminate stress risers.
  - (iii) In the case of continuously supported rail, the bottom and sides of the base must be ground flush with the parent metal.

        (iv) Overheating the rail when grinding must be avoided. If a weld has cooled to below 500°F it must be ground so as to not increase the temperature back above 500°F.

        (v) Finish grinding shall be conducted when the weld temperature is less than 200°F.

    (7) Welds shall be identified on the rail with a unique number and the date using a highly visible paint or paint stick to allow identification of a particular weld.

    (8) Welds shall be inspected once completed and ground.

        (i) A visual inspection shall be conducted immediately. This inspection shall look for voids, nicks, gouges, sharp protrusions, or other obvious surface defects.

        (ii) An inspection of the alignment of the weld shall be conducted using a 36" straight edge centered on the weld. The weld will meet the following criteria:

            1. There shall be no dip.

            2. The crown shall not measure more than 3/50" at a point 18" from the weld.

            3. The horizontal misalignment (measured by placing the straight edge on the running side of the head) shall not measure more than 3/50" at a point 18" from the weld or at the weld if the misalignment causes a gap at the weld.

    (9) An ultrasonic inspection of the weld shall be conducted within 24 hours of the completion of the weld.

(b) Field welding on open deck bridges is permitted provided that all the following conditions are met:

    (1) A qualified contractor and/or Operating Railroad Company individual using a 17 lb. dry chemical ABC extinguisher is available to protect against fires.

    (2) A qualified contractor and/or Operating Railroad Company individual must be present for a period of at least one hour after the last field weld is finished and ground.

    (3) An extra 17 lb. ABC extinguisher must also be readily accessible as a backup.

    (4) While extinguishing any fires, the qualified contractor and/or Operating Railroad Company individual must stand upwind and aim the chemical at the base of the fire.

    (5) A qualified contractor and/or Operating Railroad Company individual must be present during the entire welding operation from beginning of welding process to at least one hour after the last field is finished and ground.

    (6) Flash butt welding, shearing and grinding shall only be performed when there is no highway or river traffic directly under the area of the welding.

    (7) Bridge timber spacing may be more restrictive than that of ballasted track. Welding shall not be performed if the tie crib is less than 5-1/2" in width or as approved by MassDOT Rail and Transit Division.

    (8) Welds on open deck bridges must be made as close to the center of the crib as possible. The minimum distance between center of weld and edge of tie shall be 2-3/4".

(9) After welding, the entire structure should be inspected for possible “hot spots” or fire.

§121.1.2(M) Electric Flash Butt Welding

(a) In general, thermite field requirements apply to this process along with the following additions:

  (1) All electric flash butt welding consumes rail (1-1/4" – 1-1/2" at each weld location).

  (2) The weld must be at least 400' from grade crossings, turnouts or other fixed objects in the track.

  (3) Anchors or resilient fasteners must be removed from at least 200' of rail on both sides of the weld before the weld is made.

  (4) Care must be taken to avoid skewing ties by binding the rail against the shoulder of the tie plates when the rails are pulled together.

  (5) Care must be taken to avoid damaging elastomeric tie pads by sliding the rail through the tie seat area of concrete ties when the rails are pulled together.

  (6) If new rail is to be welded by the electric flash butt welding method, this decision should be made before the rail is laid and distressed so that the right amount of expansion can be calculated.

  (7) When CWR strings in track are laid in track and expanded to reach a preferred rail neutral temperature (PRNT), the actual required expansion shall be reduced if the CWR strings are to be electric flash butt field welded. The amount of expansion required for a particular CWR string shall be calculated using Appendix A, “Continuous Welded Rail (CWR) Procedures.” The amount of rail to be consumed when making the two electric flash butt field welds at each end of the string shall be subtracted from the amount calculated in Appendix A, “Continuous Welded Rail (CWR) Procedures.” The resulting “net” rail expansion shall be achieved in the field when distressing and/or laying the string before welding.

§121.2(M) Bolted Rail Joints

(a) Rail ends shall be fastened together by bolted standard, compromise, or insulated joints.

(b) The use of shims or spring washers between the web of the rail and the joint bar to align the gage sides of rail heads is prohibited.

(c) The use of acetylene torches or grinding to reconfigure or change the dimensions of standard and/or compromise joint bars is prohibited.

(d) Compromise joint bars of an approved design shall only be used to join rails of the respective sections.

(e) If rail end mismatch exists after applying approved joint bars, the rail head and gage face surfaces may be adjusted by electric arc welding the smaller rail and grinding to finish the weld. Do not grind the larger rail section.

(f) Each rail joint, insulated joint, and compromise joint must be of a structurally sound design and dimensions for the rail on which it is applied.

(g) If a joint bar is cracked, broken, or because of wear allows excessive vertical movement of either rail when all bolts are tight, the joint bar shall be changed.

(h) Each joint bar must be held in position by track bolts tightened sufficiently to provide firm support for abutting rail ends and to allow longitudinal movement of rails in the joint to accommodate expansion and contraction due to temperature variations.

(i) In track with conventional jointed rail, each rail shall be bolted with all joint bar bolt holes filled.

(j) If a permanent joint connection is made between CWR and bolted rail, all joint bar holes must be filled.

(k) No rail or joint bar having a torch cut or burned bolt hole may be used in track.

(l) When a bolt is changed in a joint in Track Classes 1-5, or a frog bolt is changed, then all bolts in the connections shall be checked and retightened as required.

(m) Whenever possible, new bolts, nuts, and spring washers should be used when new or relay joint bars are applied.

(n) Lubricate joint bars with environmentally-approved lubricate. Tighten all bolts, working from center of joint bars outward. During this final tightening, tap the toes of the bars inward with a sledgehammer.

(o) In locations of elastic fasteners, the appropriate clip will be used to properly fasten the ties through the joint area.

(p) Description of joint bars:

  (1) Standard bolted rail joints consist of either head free or head contact standard bars or compromise joint bars held in position by track bolts having sufficient tension to firmly support abutting rail ends, but not too tight to prevent longitudinal movement in joints to accommodate expansion and contraction due to variation in rail temperature.

  (2) Head free bars must have the inner surface of the head of the bar held tightly against the rail head fillet with the heel of the bar standing out the proper distance from the base fillet, where all of the “draw-in” for wear is concentrated.

  (3) Head contact bars must have the top surface of the bar held tightly against the fishing surface under the rail head outside of the rail head fillet area. Bars must be secured in a vertical position without “cocking.”

(q) Application of standard bolted joint bars will be as follows:

  (1) Joint bars shall be applied with their full number of bolts, nuts, and spring washers according to the standard plans and specifications.

  (2) New bolts, nuts, and spring washers should be used when new or reformed joint bars are applied or renewed out-of-face.

  (3) Grease shall be applied to the fishing area of the rails, for the full length of the joint bars.

  (4) When initially applying joint bars, the bolt tension should be brought in the range of 20,000 to 25,000 lbs. and for subsequent retightening from 15,000 to 20,000 lbs. This may be approximated by an average individual with a 36" track wrench.

(r) Application of head free joint bars will be as follows:

  (1) Set bars in position, insert all bolts, and apply spring washers and nuts by hand.

  (2) Tighten up the two center nuts with a power track wrench in high gear without fully tightening to avoid locking bars in an improper position.

  (3) Strike the bead of the heads of both inside and outside bars at both ends with a hammer to force the inside faces of the bars tightly against rail head fillets. Do not strike the toe of the bar, as this tends to force the toe of the bar outward.

  (4) Tighten remainder of bolts from center of joint bars outward in high gear.

(5) Tighten all bolts in low gear, working from center of joint bars outward. During this final tightening drive the toes of the bars inward by tapping with a spike maul or sledge.

(6) By following the above procedure, proper contact will be obtained between the inner face of the bar and the rail head fillet. Also, the heel of the bar will stand out the proper distance from the rail base fillet.

(s) Application of head contact joint bars will be as follows:

(1) Set bars in position on rail; insert all the bolts, nuts, and spring washers by hand.

(2) See that the bars are in a vertical (uncocked) position as one of the center bolts is tightened by:

(i) Inserting a bar or drift pin in a bolt hole (necessary only when applying a 131 lb. bar).

(ii) Tapping toes of joint bars as bolt is tightened.

(3) Tighten all bolts, working from center of joint bars outward. During this final tightening drive the toes of the bars inward by tapping with a spike maul or sledge so that their vertical position is maintained.

(t) Maintenance of joints:

(1) Drilled ends of new rails are to be ground to remove burrs at the mills.

(2) To avoid chipping or spalling under service due to overflow of steel, the rail end faces should be cross-cut by grinding with 1/8" wheel to a depth of not less than 3/16" below the surface of the head. If the rails are not in contact, the overflowed metal should be removed from the end face of each rail. If the rails are in contact, only one pass should be made removing approximately 1/16" from each rail.

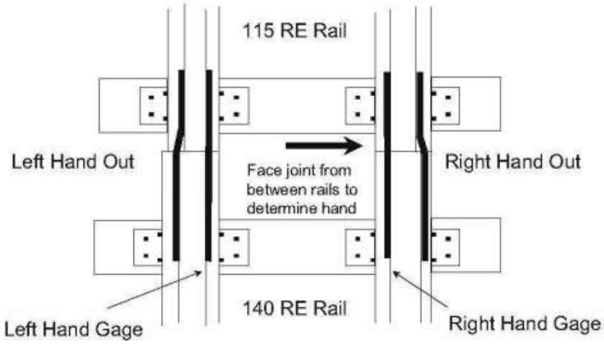
(3) When bolted joints are applied, other than insulated joints, the bolts should be tightened at the time they are applied, retightened within a week and again within a month after application.

(4) Bolts should be retightened periodically at intervals of not more than 1 year and in all cases following program track raising or surfacing.

(5) To prevent undue rail stress on account of expansion or contraction at the changes of seasons and wide temperature changes, sufficient joint bars should be loosened to permit the rail to adjust itself, immediately after which bolts should be retightened. Where necessary, a piece of rail should be cut out to avoid heat kinks or buckling of track.

(6) Wear in fishing spaces of rail should be compensated for by the application of oversized joint bars.

(u) Compromise joints are specified as left or right hand as shown in the following diagram. To determine where a left hand ("LH") or right hand ("RH") lays, stand in the center of the track and face the joint to be compromised.



Compromise Joint Example

§121.3(M) Insulated Rail Joints

(a) For new work or rail renewals in track circuit territory, insulated joints shall be located as follows:

   (1) Insulated joints shall be staggered not more than 60" nor less than 24".

   (2) Insulated rail joints at highway grade crossings shall be located in accordance with the material supplier's standard plans.

(b) For the application of Bonded Insulated Joints (Glued Insulated Joints), see the following:

   (1) Glued plug insulated joints are required on all concrete tie tracks.

   (2) When utilizing insulated plug rails, install the shortest plug rail available so as to minimize the number of joints and/or wells added.

   (3) Conventional rail joints adjacent to bonded insulated joint rails should be field welded.

   (4) All bonded insulated joints are to be installed as suspended joints. If it is absolutely necessary to install the insulated joint as a supported joint on a wood crosstie, an approved type rubber tie plate must be used under the joint. The end posts should not project above or beyond rail heads and should be trimmed with a hack saw.

   (5) Double shoulder tie plates or elastic fastener tie plates should be used on the two wood crossties supporting suspended bonded insulating joints.

   (6) Rail holding spike heads must be in reverse position and must be carefully driven to ensure that spike head is not in contact with the bar, which could result in the joint's being short circuited. All bonded insulating joints will have plate holding spikes installed.

   (7) Joints installed with elastic fasteners shall have the correct clips (modified "e" clip) applied to prevent possible damage to the joint.

   (8) No attempt should be made to tighten bolts in bonded insulated joints. In the event the bolts in the joint become loose, the joint should be replaced.

(9) Any rail head overflow at a bonded insulated joint is to be removed by grinding. Extreme care must be exercised to ensure that the end post is not damaged. The overflow should be ground only to the rail end, so that the joint gap will not be greater than the original gap. A cross grinder/slotter should not be used to remove the overflow.

(10) Bonded insulated joints will be considered as welded rail for purposes of compliance with the anchoring requirements of §125.1(M).

(11) Glued plug insulated joints shall be used in CWR (unless approved by MassDOT Rail and Transit Division).

(c) For the application of Polyurethane Coated Steel Insulated Joints (Poly Joints) see the following:

(1) Polyurethane coated (poly) steel insulated joints may be used permanently in track where the use of a bonded insulated jointed rail is not practical.

(2) Whenever possible, poly insulated joints are to be installed as suspended joints.

(3) The top of the poly joint must be set first into the fillet area of the rail. Bolts should be applied and tightened from the center out to the end of the bar.

(4) Rail holding spikes shall be reversed and not driven up against the poly joint.

§123.0(M) TIE PLATES

(a) Tie plates shall be installed and centered under running rails on all wood crossties, switch timber, and bridge timber.

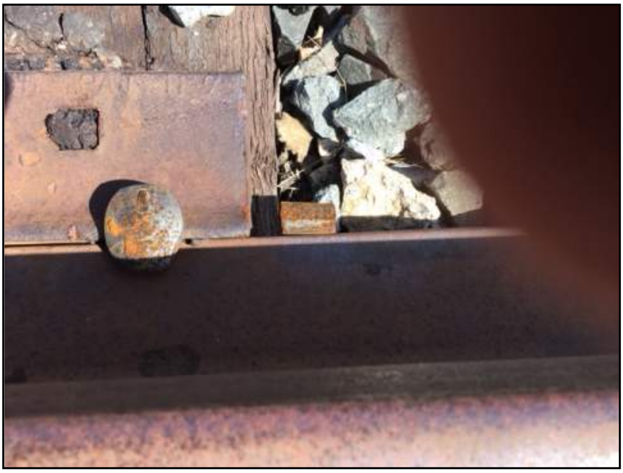
(b) The preferred tie plate is a 14" double shoulder canted (1:40) plate (DSC).

(c) Tie plates with different cants and flat plates shall not be mixed.

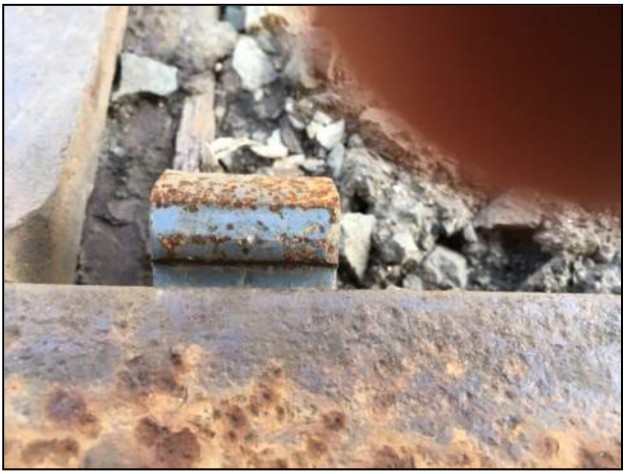
(d) Canted tie plates shall be installed so that the rail cants towards the centerline of track.

(e) Tie plates must be placed square and tight to the base of the rail and no portion or part of the shoulder can be under the base of the rail.

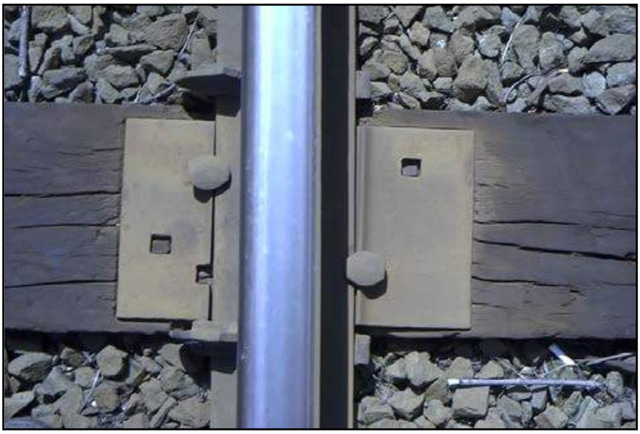
(f) No metal object that causes a concentrated load by solely supporting a rail shall be allowed between the base of the rail and the bearing surface of the tie plate (e.g., tie plate shoulders, spikes, ballast, etc.).



Tie Plate with Anchors Applied Correctly



Tie Plate with Anchors Overdriven



Box Anchored Ties with Anchors Applied Correctly

§124.0(M) TIE PADS

The use of tie pads, under the tie plates on open deck bridges, may be used only with the approval of the MassDOT Rail and Transit Division.

§125.0(M) RAIL ANCHORS/ELASTIC FASTENERS

§125.1(M) Anchor Placement

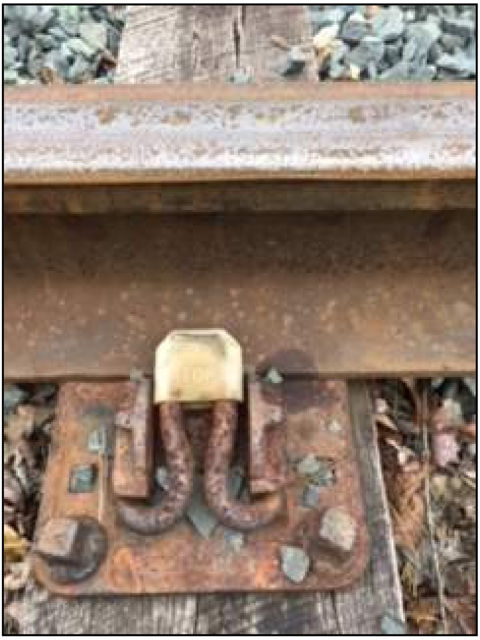
(a) Rail anchors shall be applied as follows:

- (1) Anchors shall be applied on both rails and on the same side of the tie. Where special applications may be necessary, other arrangements may be used with permission of the MassDOT Rail and Transit Division.
- (2) Wherever practicable, rail anchors shall be applied from the gage side of the rail.
  - (i) In turnouts, drive on type anchors shall be applied to switch stock rails from the field side of the track. Care must be taken in application of anchors so as not to foul switch rods.
- (3) When adjusting or laying rail, the necessary anchor pattern shall be applied immediately as the rail is adjusted.
- (4) Anchors should be fit tightly against sound ties.
- (5) When ties at a joint cannot be anchored because of interference with a joint bar, there shall be no anchors applied to the affected joint.

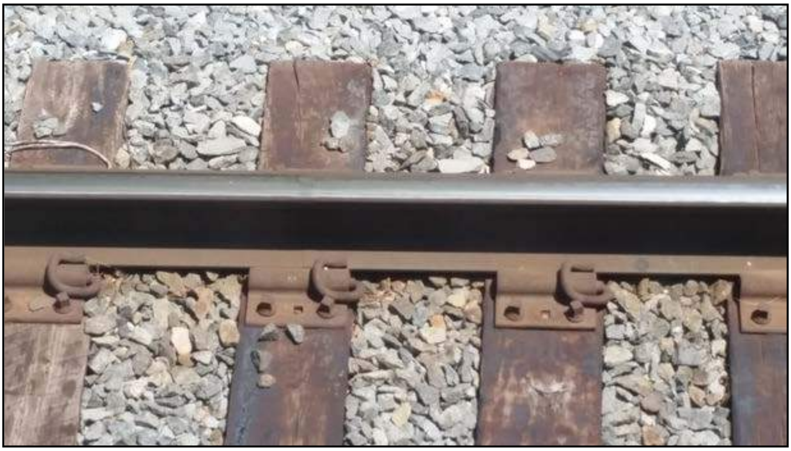
§125.2(M) Fasteners Required

(a) Rail anchors should be driven just far enough so that the locking lip or groove of the anchor snaps into place on the base of the rail.

(b) A sufficient number of anchors must be applied in a pattern to effectively control longitudinal rail movement. See next pictures for typical fastening and anchoring systems.



Elastic Fastener: Pandrol Fast Clip



Elastic Fastener: Pandrol E-Clip

(c) Insufficient anchors may result in longitudinal rail movement and allow changes in rail neutral temperature (RNT) in CWR.

(d) The movement of rail can result in changes in line and surface, which may create a hazardous condition.

(e) Additional anchors must be applied if there is a standard anchor pattern and there is evidence that rails are still moving longitudinally under traffic.

(f) It should be recognized that when track is raised out-of-face, the resistance to longitudinal movement is reduced and additional anchors may be required to avoid undue rail and tie movement.

(g) Basic anchor requirements in CWR track:

    (1) Every other tie shall be box anchored in all CWR tracks.

    (2) Box anchor every tie in curves 3° and over.

    (3) Additional anchors may be added at designated locations in anchored track or elastic fastener territory as required if longitudinal movement of the rail is detected.

(h) On main tracks the number of anchors to be applied when CWR is laid and maintained is as follows:

    (1) When using rail anchors, box anchor every wood tie 200' in each direction from:

        (i) Ends of CWR strings.

        (ii) All joints to include glued plug insulated joints.

        (iii) Turnouts, crossovers, and other special trackwork.

        (iv) Rail track crossings.

        (v) Public and private highway grade crossings.

        (vi) Transitions to locations with elastic fasteners.

        (vii) Transitions to locations of tie type change (e.g., wood to concrete or wood to steel).

        (viii) Open decks on bridges, where the timbers are hooked and blocked in accordance with §119.1(M).

    (2) To the extent practical, fully box anchor all ties in CWR within switch, turnout, and crossover areas.

(i) Rail anchoring systems shall be used on open deck bridges, trestles, and viaducts as determined by the MassDOT Rail and Transit Division.

(j) All jointed rail tracks require:

    (1) A minimum of 40 anchors for a 78' rail and be boxed on 20 ties.

    (2) A minimum of 16 anchors per 39' rail and be boxed on 8 ties.

    (3) A minimum of 10 anchors per 33' rail and be boxed on 5 ties.

    (4) No anchors will be placed in grade crossing panels (unless approved by MassDOT Rail and Transit Division).

(k) A fully clipped wood tie, bridge timber, or fully clipped and insulated concrete tie with an elastic fastener, is considered equivalent to a box anchored wood tie.

§125.3(M) Anchor Maintenance

(a) Ineffective anchors shall be removed and replaced when installing railing.

(b) Rail anchors must have full bearing against the tie, or tie plate, when applied.

(c) In order to avoid damage, only proper tools or machines should be used in applying and removing rail anchors.

(d) Anchors should never be applied with a spiking hammer.

(e) Anchors should not be driven along the base of the rail with a hammer.

(f) Care should be taken not to strike the rail.

(g) When the bearing of rail anchors against the tie is disturbed by renewing or re-spacing ties or replacing rail, or the anchor was not properly applied, the anchors must be taken off and then re-applied in proper position. All anchors removed must be re-applied, and defective or broken anchors must be replaced as necessary.

(h) Proper opening between rail ends in jointed rail is maintained by the use of rail anchors.

§125.4(M) Anchor Use

New or relay rail anchors may be used at any location on the MassDOT system as long as they are designed for the rail section to which they are applied and perform as intended.

§127.0(M) RAIL FASTENING SYSTEMS

§127.1(M) Number Required

(a) Track shall be fastened by a combination of components which effectively maintains gage to the prescribed limits.

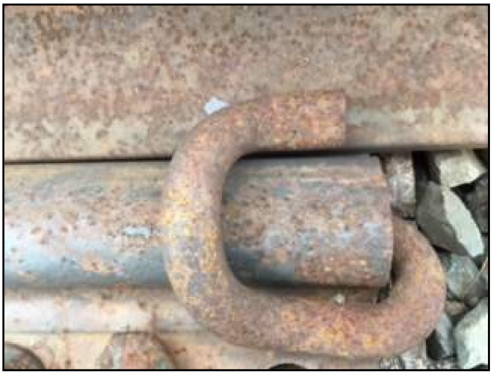
(b) Additional fasteners may be used where they are needed to hold gage and/or restrain the movement of rail (both longitudinal and lateral).

§127.2(M) Installation of Fasteners

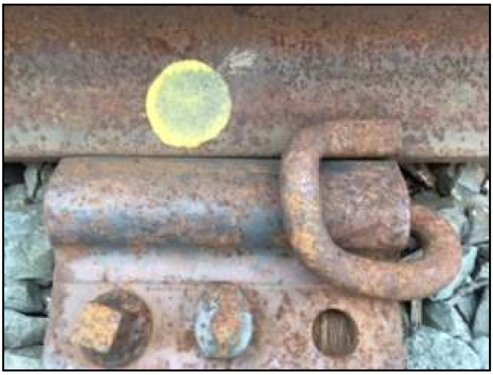
§127.2.1(M) Elastic Fasteners/Clips

(a) All elastic fasteners shall be inserted or removed from the specially designed tie plate with an approved device such as an 8 lb. sledgehammer. ***The use of a spike maul is prohibited.***

(b) Elastic fasteners shall not be overdriven as overdriving will cause premature relaxation of the fastener.



Overdriven Pandrol E-Clip



Correctly Driven Pandrol E-Clip as End of Clip Lines Up with Edge of Tie Plate

(c) If a fastener has been overdriven or is not performing its intended function of limiting the vertical and longitudinal movement of the rail, it shall be replaced.

(d) In the case of an “e” clip, a distance of 3/8" (approximate width of a wooden pencil) between the shoulder and the face of the clip should be maintained. This clearance will prevent overdriving.

(e) When applying clips with a sledgehammer, the clip must be gently tapped to ensure proper insertion before the clip is fully seated. When removing clips with a sledgehammer, secure clip with foot and gently tap clip to remove the toe load to ensure safe removal of the clip.

(f) When installing clips, the tie must be tamped up flush with the base of the rail before driving the clip so as not to damage the clip. The clip is not to be used to pull the tie up to the base of the rail.

§127.2.2(M) Screw Spikes

(a) A 15/16" diameter lag screw shall be used to secure elastic fastener plates with 1" diameter holes to wood ties and timber. Lag screws must be screwed into a 11/16" diameter pre-drilled hole that is 6" deep. Driving of lag screws with a sledgehammer or spike maul is prohibited.

(b) As shown in the MBTA Standard Plan Book 1225, in turnouts, gage, slide, heel, frog and standard tie plates, all round holes will be filled with a screw spike except:

  (1) Self-aligning frog tie plates shall have one screw spike installed on each end of each plate.

(c) Holes for screw spikes shall be pre-drilled 11/16" in diameter and 6" deep.

§127.2.3(M) Cut Track Spikes

(a) All spikes (cut spikes) shall be driven with the head pointed toward the rail, except that spikes driven against the sides of insulated joints shall be driven with the head pointing away from the rail and not be in contact with the joint bars.

(b) Spikes should not be driven at ends of insulated joints as rail movement may cause the insulated joint bar to become electrically connected to the rail.

(c) Spikes must be started vertically and squarely and driven straight. The shank of rail holding spikes must have full bearing against the base of rail. Spikes should be driven in accordance with the AREMA Manual, Chapter 5, leaving 1/8" clearance between the spike head and the base of the rail. Do not overdrive spikes.

(d) The use of lock spikes (hair pins) are prohibited. When existing lock spikes are removed they shall be replaced with cut spikes.

(e) Care must be taken not to strike the rail, its fastenings, or signal appliances when driving spikes.

(f) Spikes in main tracks, that have a cut throat, or are deteriorated due to rust, should be replaced.

(g) All old spikes, when pulled, shall be picked up and scrapped.

(h) Track spikes shall not be driven into round plate holes.

(i) When the head of the track spike is broken off, the replacement spike should be inserted in a new location, leaving the spike stub in the tie.

(j) All spike holes shall be plugged with cedar wood plugs, or with an approved plugging material, prior to re-spiking.

§127.3(M) Rail Fasteners Required

(a) Track shall be fastened by a system of components that effectively maintains gage within the limits prescribed.

(b) When spikes or elastic fasteners are used (unless otherwise ordered by the MassDOT Rail and Transit Division), each rail shall be fastened to every tie in the following manner:

Track **Conventional Tie Plates**	**Rail Holding Spikes**	**Plate Holding Spikes or Lag Screws**
Tangent and curves up to 1°	3 (1 field side rail holding; 2 gage side rail holding)	0
Curves between 1° and up to 4°	3 (1 field side rail holding; 2 gage side rail holding)	1 (1 field side)
Curves 4° and over and curved leads on all turnouts and crossovers	3 (1 field side rail holding; 2 gage side rail holding)	2 (1 field side; 1 gage side)(1)
Elastic Fastener Tie Plates	**Elastic Fasteners (Clips)**	**Lag Screws**
Tangent	2 clips	2 (1 field side; 1 gage side)(1) (2 cut spikes – 1 in each square hole field and gage)
All Curves	2 clips	4 (2 field side; 2 gage side) (2 cut spikes – 1 in each square hole field and gage)
All track with pre-plated ties	2 clips	4 (2 field side; 2 gage side)

Note:
(1) Apply diagonally on opposite side of clip.

§129.0(M) TRACK SHIMS

(a) If track does not meet the geometric limits (e.g., crosslevel or profile), track shims may be installed to temporarily correct the track surface.

(b) Shimmed track must be watched carefully to ensure that shims are in place and tight, and that proper gage and crosslevel is being maintained.

(c) If shims are used, they must be removed as soon as the weather, or other conditions, permit the track to be surfaced.

(d) Tie plates must not be removed from the ties as a means of adjusting the surface or crosslevel of track.

(e) Track shims must be at least the size of the tie plate and be spiked directly to the tie with spikes which penetrate the tie at least 4-1/2".

(f) Track shims must be bored where spikes are to be driven, and made of a material approved by MassDOT Rail and Transit Division.

(g) Track shims shall be braced if the shim is over 1" in thickness.

(h) Design and materials used in braces shall be approved by MassDOT Rail and Transit Division.

§145.0(M) BRIDGE GUARD RAILS

§145.1(M) Location

(a) A bridge guard rail is a continuous line of rails, connected by bolted joints or welds. The guard rail is fastened to the crossties or bridge ties adjacent to the gage side of the running rail.

  (1) One such rail is designated in these instructions as a “Single” bridge guard rail.

  (2) Two such continuous lines of rail, one adjacent to the gage side of each running rail is designated as a “Full” bridge guard rail.

(b) Guard rails are applied between the running rails of tracks at undergrade bridges which meet the below listed criteria. Full bridge guard rails shall be installed at the following locations:

  (1) Open deck bridges.

  (2) Ballast deck bridges.

  (3) Truss bridges (all).

  (4) Moveable bridges (all).

  (5) Other locations as directed by MassDOT Rail and Transit Division.

(c) Existing bridge guard rails applied in accordance to previous standards or practices need not be changed (unless instructed by MassDOT Rail and Transit Division).

(d) When it is necessary to remove bridge guard rail to perform work, bridge guard rail will be reinstalled only where required by the above instruction.

§145.2(M) Materials

(a) Suitable scrap or relay running rail may be used. The installed rail section will be approximately:

  (1) Level, but not more than 3/4" below the top of the adjacent running rails as per MBTA Standard Plan Nos. 3060 and 3062.

  (2) But in no case higher than the running rail.

(b) Install tie plates under guard rails on every other tie or timber. Tie plates should be installed with reverse cant.

(c) Joints shall be either four or six hole bars with a minimum of four bolts per joint. Joint bars shall not be used within the curved end section of the guard rail.

§145.3(M) Application

(a) Bridge guard rails shall extend a minimum distance of 39' (for speeds up to 60 MPH) and 78' (for speeds over 60 MPH), beyond each end of the bridge abutment, unless increased distances have been prescribed for specific territories or locations.

(b) The end of the bridge guard rails should be curved and brought to the center of the track.

(c) Guard rail ends shall have the rail ends beveled, bent down, or be fitted with a bridge guard rail nose. Each end shall be fastened to the center of the track so as to divert a derailed wheel and not catch dragging equipment.

(d) The guarding face of bridge guard rails on open deck bridges shall be parallel to and 12-5/8" from the gage of the running rail. If plates and clips are used on open deck bridges, see Paragraph (e) below.

(e) The distance of the guarding face will be changed in the following locations:

  (1) On ballasted deck bridges the guarding face shall be at 18".

  (2) On ballasted approaches to bridges the guarding face shall be at 18".

(f) Guard rail ends shall rest on a sound tie and be securely fastened.

§145.4(M) Inspection and Maintenance

Guard rails shall be inspected periodically to make certain that bolts and joints are tight, spikes are firmly against base of the rail, and castings fastened securely to rail ends, or ends properly beveled or bent down.

Subpart E - Tools

§150.0(M) TOOL REQUIREMENTS

(a) The person who is responsible for performing the track/switch inspection shall plan ahead and coordinate with the Operating Railroad Company to ensure that inspection tools are available when the inspection is made.

(b) The person who is responsible to perform track inspections shall notify the Operating Railroad Company when tools become in disrepair so that a tool can be fixed or replaced.

(c) Specified numerical limits given in this Part are to be confirmed during the track/switch inspection with the appropriate tool.

  (1) Values are not to be estimated or approximated.

  (2) Only values measured with approved tools are to be recorded on the Track Inspection Form.

(d) The person who is responsible for performing track inspections is encouraged to make periodic recommendations for improvements in existing tools or gauges and changes in tools that are needed to make the required inspection measurements.

§150.1(M) *Inspection Tools*

(a) Marking materials, as noted below, may be used to mark stations, tie lengths, dimensional data, and other information that will be made part of the inspection.

  (1) Crayon (keel);

  (2) Permanent metal marker.

(b) A mirror to be used to view difficult areas, especially the base or fillet of the rail, or connections to the moveable point frog and switch point area.

(c) A cloth measuring tape or folding wooden ruler may be used to measure track components and ties in the turnouts. The tape or ruler shall be non-conducting. The tape or folding wood ruler can also be used to measure switch point throw, frog guard face, and guard check, stations for alignment measurements, rail flow, tie spacings, offsets, and other key dimensional data.

(d) A standard combination track gauge with level shall be used so that gage, flangeway width, crosslevel, and superelevation measurements can be made.

  (1) Level Board:

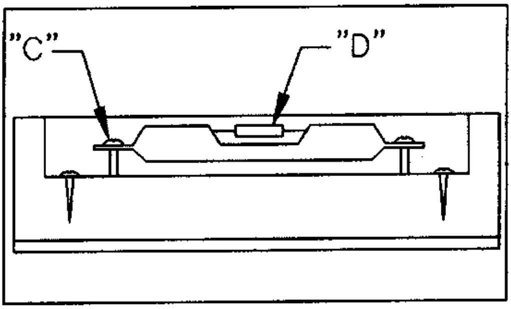
    (i) The person who is responsible for performing the track inspection shall ensure that the level board is checked and maintained to measure correct crosslevel readings.

  (2) Adjusting a Level Board:

    (i) Set the level board on the tangent track where accuracy was checked and the difference in elevation between the two rails is known.

    (ii) If required, turn the adjusting screw “C” to return the bubble “D” halfway between the readings for the known elevation. Center the bubble if possible.

      - Turning the adjusting screw to the right moves the bubble away from the screw (Memory Aid: “Turn screw right away”).
      - Turning the screw to the left moves the bubble toward the screw.



(iii) Turn the level board end for end and place it at the same point on the track.

(iv) See if the bubble is centered or the same. If the bubble rests at the same place, the board is adjusted.

(v) If the bubble readings are not the same, or not centered, continue steps (ii) through (iv). When the bubble is always at the same location (and centered), the level board is adjusted.

(3) Adjusting a level board by bubble positions:

(i) Place level board on the rails.

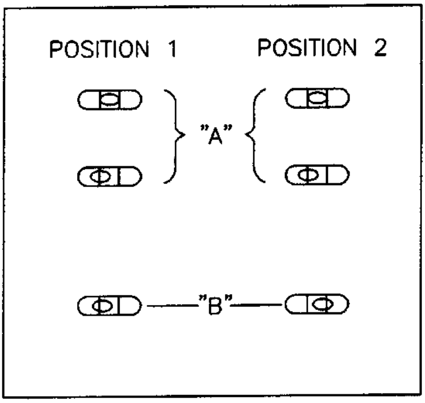
(ii) Note position of the bubble.

(iii) Turn level board end for end and place it at the same point on the track.

(iv) Note position of the bubble again.

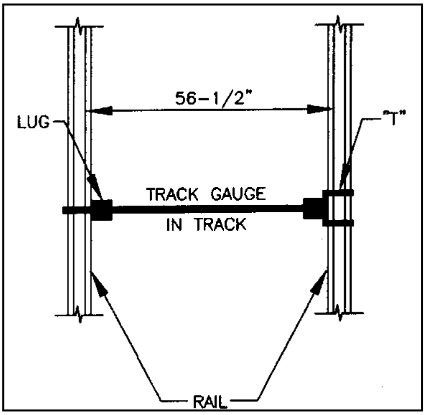
(v) If the bubble comes to rest in the same position both times "A", the board is in adjustment.

(vi) If the bubble comes to rest in different positions "B", adjustment of the board is necessary (see "Adjusting a Level Board" (d)(2)).

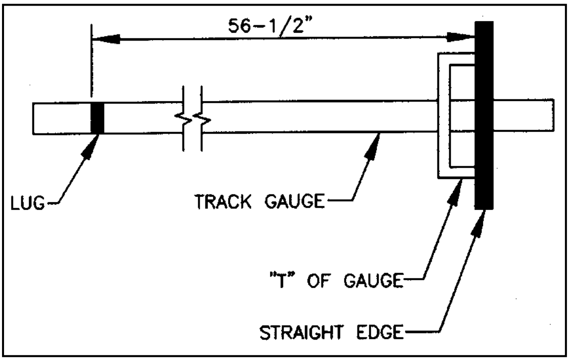


(4) The Track Inspector shall check and verify daily prior to use that standard track gauges are correctly measuring track gage.

(e) Checking a non-adjustable fixed track gauge.



(1) Turn the gauge upside down.
(2) Place a straight edge along the "T" of gage.
(3) Measure the distance between the nearest face of straight edge and the lug.
    (i) If the measurement is 56-1/2", the track gage is accurate.
    (ii) If the measurement is not 56-1/2", the track gage is inaccurate. DESTROY AND DO NOT USE IT!



Track Gage Check

(f) A machined straight edge (minimum of 18" in length) shall be used to measure batter and chipping of rail ends, wear, flattened rails, mismatches (gage and tread) and engine burns on frogs and rail heads.

(g) A 36" machined straight edge with taper gauge shall be used to measure the straightness of field and plant welds.

(h) A taper gauge shall be used in conjunction with the straight edge to measure the depth of engine burns, flattened rails, and other anomalies in the rail head. In addition, the taper gauge shall be used to measure switch point/stock rail gap, and the gap at the moveable point frog.

(i) Stringline equipment capable of measuring 31' and 62' chords shall be used to check “alignment” spots. A discussion of stringlining curves is given in §55.2(M).

(j) Approved magnetic rail thermometer shall be:

  (1) Calibrated in Fahrenheit, with a temperature range of 0°F - 150°F or as approved.

  (2) Encased in housing with strong magnet(s) for attaching to web of rail.

  (3) Meet AREMA Standard Rail Thermometer Plan 34-71, or approved equal.

(k) The following gauges may be used to check critical dimensions in and around frogs:

  (1) Flangeway gauge: the gauge is designed to measure the flangeway in worn frogs so that grinding and welding repairs can be programmed. The gauge to be used by the Track Inspector shall conform to AREMA Plan No. 790-94.

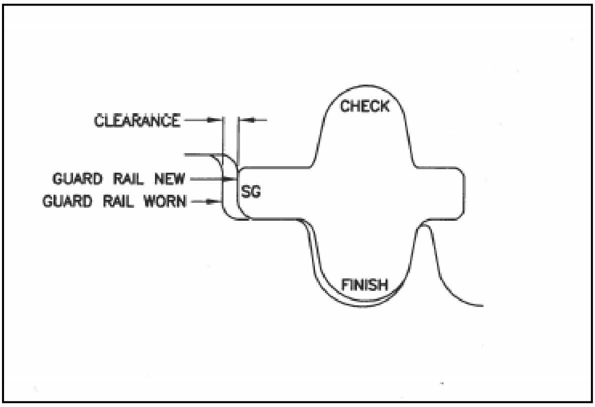
  (2) Guard wear gauge: the gauge is designed to measure the wear on the guarding faces on a self-guarded frog.

    (i) See AREMA plan for permissible variations in dimensions due to wear of frogs.

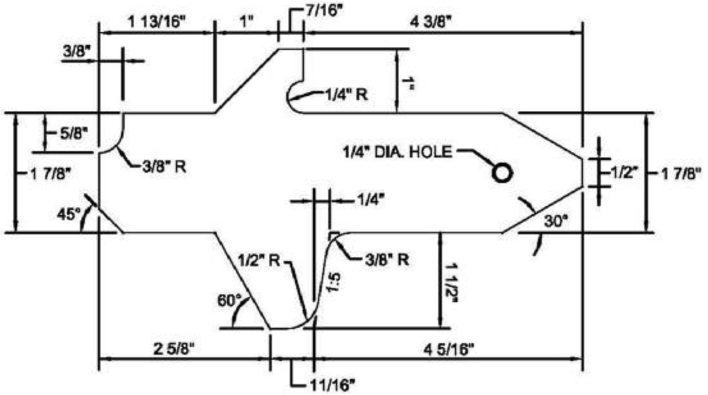
  (3) The check gauge is used to test the flangeways in worn frogs and crossings for grinding or for welding repairs when necessary. It is designed for normal 1-7/8" flangeways and proper allowance should be made when used with wider flangeways. Standard contour gauge for self-guarded frogs is shown on the next page.

  (4) The following check gauge graphic is used to measure flangeway widths in worn frogs and crossings to determine necessary welding and/or grinding repairs:

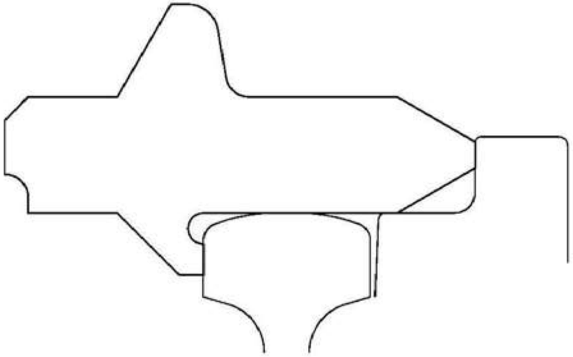
    (i) The gage is designed for normal 1-7/8" flangeways.



  (5) The gauge to be used by the Track Inspector shall conform to AREMA Plan No. 790-02 as shown on the following pages.

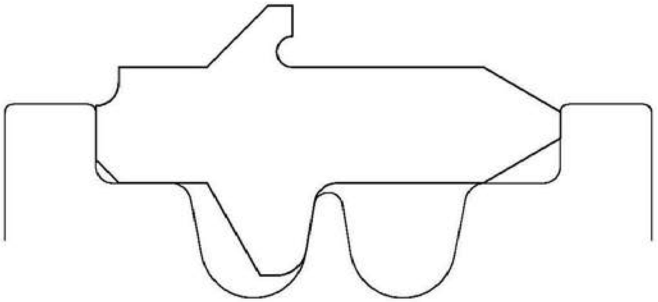


DATA FOR GAGING
GUARD WEAR ON
SOLID SELF GUARDED FROGS



SECTION AT TOE EXTENSION

DATA FOR GAGING
GUARD WEAR ON
SOLID SELF GUARDED FROGS



SECTION AT ACTUAL POINT

DATA FOR GAGING
GUARD WEAR ON
SOLID SELF GUARDED FROGS

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SUBPARTS A-H

RECOMMENDED PRACTICE FOR THE MAINTENANCE OF SPECIAL TRACKWORK

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RECOMMENDED PRACTICE FOR THE MAINTENANCE OF SPECIAL TRACKWORK

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Subpart A – General

§1.0(STM) SCOPE

(a) This subpart will provide guidance as to the types of maintenance and maintenance limits required for special trackwork**.**

(b) This subpart shall be used by the MassDOT' s Operating Railroad Companies to maintain a safe, reliable track structure in the most economical and efficient manner possible.

(c) Forces engaged in the repair of special trackwork and appliances shall be aware that their maintenance goal is to provide a safe and reliable track structure with a superior ride quality.

(d) Ensuring adequate spare material inventory for all trackwork is the responsibility of the Operating Railroad Companies.

§2.0(STM) MAINTENANCE RESPONSIBILITIES

(a) MOW personnel in charge of making repairs and performing maintenance of turnouts and other trackwork shall attend and successfully complete courses prescribed by the Operating Railroad Companies.

(b) For Track Classes 1-5, individuals designated to supervise the maintenance, restoration, and renewal of trackwork shall be designated in accordance with FRA §213.7.

§3.0(STM) SCHEDULED MAINTENANCE ACTIVITIES

(a) Turnouts and other special trackwork must be maintained on a regular basis to:

   (1) Provide a safe and reliable track structure;

   (2) Provide acceptable ride quality;

   (3) Maximize the useful life of the special trackwork.

(b) The maintenance schedule for special trackwork is driven by:

   (1) Location of the special trackwork;

   (2) Frequency and accumulated tonnage over the special trackwork;

   (3) Type and maintenance history of the special trackwork;

   (4) Inspection reports of the Operating Railroad Companies.

(c) A summary of scheduled maintenance activities for special trackwork is given in the following table. This table is not intended to be all-inclusive and only identifies the major activities that are usually associated with special trackwork maintenance.

Scheduled Maintenance Activities for Special Trackwork

- Lubrication of switch and spring frog plates
- Maintenance grinding of frog, switch point, and stock rails
- Maintenance grinding of welds, forged areas, and slotting of mechanical joints
- Maintenance welding of worn frogs
- Maintenance welding of engine burns ($\leq$3/8")
- Production grinding of special trackwork and approaches:*
    - 8-12 stone production switch grinder
- Inspection of gage, with attention to the spread of the rail due to defective fasteners, timber, and/or rail wear
    - Inspection of guard face gage, guard check gage and track gage
- Inspection of head block area (switch stand, timbers, and latches)*
    - Check the crank eye bolt under the switch stand to include cotter pin
    - Check the upright bolt and cotter pin at the connection between number 1 rod and the throw rod
    - Inspect all switch locks, circuit controller (CC) box, and unlock box for proper number and placement
    - Throw turnout to observe for loss of motion
    - Observe switch point and stock rail fit
- Maintenance, cleaning, and adjustment of switch targets
- Maintenance and replacement of gage plate and rod insulation*
- Spot tamping of trackwork*
- Out-of-face surfacing and alignment of trackwork*
- Spot replacement of major trackwork components (stock rails, switch points, frogs, etc.)*
- Spot rail replacement to include the replacement of insulated joints and curve worn rail*
- Bolt maintenance: tighten or replace loose and defective bolts and torque to specifications; inspect and install cotter pins as required
- Replacement or adjustment of defective fastener systems
- Maintenance of drainage and waterways
- Vegetation management
- Ballast maintenance
- Out-of-face ballast replacement (undercutting and shoulder ballast cleaning)*

***The Signal Department shall be notified prior to maintenance and inspection as noted above. In addition, the Signal Department must be notified when work is required on the following items:**

- Insulation on bridal plates
- Insulation on switch rods
- Repair/replacement of insulation joints
- Protection of track wires and bond wires

§4.0(STM) UNSCHEDULED MAINTENANCE ACTIVITIES

(a) Unscheduled maintenance activities are maintenance activities that cannot be planned or programmed.

(b) Unscheduled maintenance of special trackwork and components can be due to:

(1) Any signal failure.

(2) Natural events, such as fire, flood, severe storms, and extreme temperatures or extreme variations in temperature, and earthquakes.

(3) A sudden change in the type of traffic, speed of traffic, or frequency of traffic over special trackwork.

(4) A “run through” or derailment within the area of special trackwork or a component of special trackwork.

(5) Failure of a component or components.

Subpart B – Maintenance Program

§5.0(STM) MAINTENANCE

Refer to §5.0(M)

§6.0(STM) PLANNING AND COORDINATION

(a) Refer to §3.0(STM) for the list of maintenance activities that shall be planned and performed by track forces.

(b) Programmed maintenance shall provide for the safety of train operations and shall be carried out in a cost-effective manner to provide maximum life to the trackwork and maximum benefit to the Operating Railroad Company.

(c) The information contained in inspection reports shall be used to plan trackwork maintenance.

(d) Program maintenance and/or capital maintenance and production should be internally coordinated with the Operating, Signal, and Bridge & Building (B&B) Department of the Operating Railroad Company.

(e) Planned maintenance that involves work within private rights-of-way (i.e., grade crossings and utilities), shall be coordinated with fire, police, public safety, and appropriate utilities (call 811 for Dig Safe). Also coordinate with local Department of Public Utilities (DPU) and/or State District.

§7.0(STM) QUALITY CONTROL

(a) The person in charge of performing the maintenance activity or repair shall be responsible for the overall quality of the work performed.

(b) All maintenance work shall be performed in accordance with these practices.

(c) An Operating Railroad Company Official shall periodically review the work performed for quality, consistency, and adherence to (b).

(d) Trackwork repairs that are deficient:

  (1) May be cause for remedial action.

  (2) Shall be brought to the attention of an Operating Railroad Company Official.

(e) An Operating Railroad Company Official shall see that any additional work necessary is performed to bring the repair into compliance with MassDOT recommended practice and shall re-inspect for substandard or deficient work.

(f) Operating Railroad Company personnel are encouraged to make recommendations as to the required modifications to methods, procedures, and practice to improve the overall quality of work.

Subpart C – Scheduled Site Maintenance Activities

§33.0(STM) DRAINAGE AND WATERWAYS

Drainage in and around special trackwork shall be maintained in accordance with §33.0(M).

§37.0(STM) VEGETATION MANAGEMENT

Vegetation in and around special trackwork shall be maintained in accordance with §37.0(M).

Subpart D – Maintenance Limits

§50.0(STM) SCOPE

(a) Maintenance is the repair or replacement of a component of special trackwork which may include switch points, frogs, and fastenings.

(b) Maintenance limits are to be used as a triggering mechanism that prompts maintenance or reconstruction.

  (1) It is MassDOT's goal to have special trackwork that is maintained above FRA minimum standards.

  (2) As special trackwork components wear, maintenance should be programmed before the track reaches the maintenance limits.

  (3) Maintenance must be executed whenever the maintenance limits are exceeded and completed prior to reaching the FRA minimum standards.

  (4) Whenever possible, special trackwork should be repaired or reconstructed to as-new condition.

(c) The maintenance limits and recommended practice for special trackwork and other trackwork are found in this subpart or the applicable maintenance sections.

§53.0(STM) GAGE

Refer to §53.0(M), "Gage."

§55.0(STM) ALIGNMENT

(a) Maintenance shall be performed when alignment values reach the limits given in §55.0(M) Alignment.

(b) The straight stock rail (open point) in a turnout is the line rail. If stations fall within undercut portions of the stock rail, alignment measurements may be taken on the field side of the stock rail.

(c) In special trackwork, alignment deviation in curves is the difference in the mid-ordinate value between adjacent stations and not the average of multiple stations (uniformity) as given in FRA §213.55.

§63.0(STM) TRACK SURFACE

(a) The following criteria:

  (1) Will serve as a practical guide for the maintenance of smooth riding conditions in special trackwork; and

  (2) Will minimize the wear on special trackwork, special trackwork components, and rail vehicles.

(b) For Track Classes 1-5, surface may not deviate more than the amount prescribed in the table in §63.2(M).

Subpart E – General Maintenance Requirements

§133.0(STM) TURNOUTS AND CROSSOVERS

§133.1(STM) Use of Turnouts and Crossovers

(a) Turnouts and crossovers are designated by their frog numbers and should be used as follows:

(1) No. 20: At interlocking plants for crossing over of high speed trains from one main track to another main track (normally used in the same or reverse direction in locations where the normal speed is 50 MPH or more).

(2) No. 15: At interlocking plants for movements to another main track (normally used in the same or reverse direction, where conditions do not justify or afford the distance required for No. 20 frogs). For diverting trains to sidings or other tracks and returning trains to main tracks through power operated or spring switches.

(3) No. 10: For all other turnouts from main tracks and sidings, where practicable, and in yards and terminals.

(4) The use of other turnouts must have the approval of MassDOT Rail and Transit Division.

§133.2(STM) Speeds Through Turnouts

(a) The maximum permissible speeds through turnouts when located in tangent track will be as follows:

Frog No.	Switch Point/ Switch Rail Length (Ft.)	Maximum Authorized Speeds (MAS) (MPH)
20	59'-6"	60*
20	39'	45
20	39'	60*
15	38'	30
15	26'	30
10	27'	15
10	16'-6"	15
8	16'-6"	10
Note: * With equilateral turnouts only.		

(b) When turnouts or crossovers are located in curved tracks, speed must be adjusted in accordance with FRA §213.57.

(c) The maximum authorized speed (MAS) through turnouts shall be designated by the MassDOT Rail and Transit Division.

§135.0(STM) SWITCHES

(a) Switch points and moveable points should be kept in line and surface with all bolts tight and cotter pins in place.

(b) Switch points must fit the stock rails closely and accurately, with a full bearing against the head of the stock rail. If a wear pattern indicates bearing only along the top edge of point, the cause of wear shall be investigated and corrected.

(c) When an open switch point is found of more than 3/16", it must be immediately corrected and/or removed from service.

(d) Each switch stand in connecting rod must be securely fastened and operable without excessive loss of motion.

  (1) Connecting rod bolts must be of the proper size and installed with the bolt facing upwards and the nut on top.

  (2) The upright bolt and nut shall be drilled to accept and installed with a cotter pin.

(e) Switch points and stock rails should have the overflow ground off. Attention should be given to the overflow and fit of the back side of the switch point to the stock rail.

(f) When necessary to replace individual switch points or stock rails, use replacement material of similar kind (i.e., Samson points to Samson stock rails; plain points to plain stock rails).

(g) When replacing or changing a switch point, replace switch points and stock rails as a set:

  (1) Fastenings must be intact and maintained so as to keep the components securely in place.

  (2) Also, each switch, frog, and guard rail must be kept free of obstructions that may interfere with the passage of wheels.

  (3) Classes 3-5 track must be fully box anchored through and on each side of track crossings and turnouts to restrain rail movement affecting the position of switch points and frogs. Elastic fasteners designed to restrict longitudinal rail movement are considered the same as rail anchors.

(h) Adequately fasten switch points and stock rails to prevent lateral and longitudinal rail movement.

(i) Upright bolts used with horizontal switch rods must be placed with nut ends up and nuts secured with cotter pins so they can be visually inspected.

(j) Switch points shall be replaced when worn or chipped so that the top of the switch point, at any place, is more than 7/8" below the plane across the top of the stock rails.

(k) Unusually chipped or worn switch points that are found to have an unprotected flat, vertical service, 5/16" or more in width, at a depth of 3/4" below the top of the stock rail and switch point, must be removed from service and replaced immediately. This type of point wear may contribute to a wheel climb derailment.

(l) Switch points shall be replaced when the raised portion of the switch point (rise) is worn down to the level of the top of the stock rail. The purpose of the rise is to prevent the outer edge of the wheel tread from striking the stock rail and rolling the stock rail out of the switch plates and causing a derailment.

(m) Chipping or wear on any switch point should be investigated, its cause determined and corrective action taken. Wear or chipping produces a sloping surface on the face of the switch point which may tend to lift a wheel having an imperfect flange. The switch rail should be further examined to locate any point of hard contact by the wheel, which might contribute to wheel climb.

(n) Spot grinding of points is allowed to remove chips, minor burns, small imperfections, small cracks, etc., with care being taken to insure that proper profile is restored to the switch point to prevent wheel climb. Grinding is not to exceed 7/8" below top of stock rail.

(o) When changing switch points and curved closure rails, or when grinding switch points, lubricate as follows:

  (1) The gage face of the curved point and the curved closure rail.

  (2) Spot lubricate top of straight closure rail in vicinity of switch point.

  (3) Lubricate gage face of all ground switch points.

(p) Switch points, components, and connections must be examined frequently.

  (1) It is important that the stock rails are securely seated and have no movement in the switch plates.

  (2) Care should be taken to avoid canting the rail by over-tightening the rail braces.

  (3) Switch plates shall have no movement on the ties.

(q) Switch plates and moveable parts should be kept clean and lubricated with an approved graphite dry lubricant.

(r) The heel of each switch point must be secured and the bolts of each heel must be kept tight (e.g., fixed blocks).

(s) In yards when using No. 10 turnouts or smaller, and the maximum authorized speed does not exceed 15 MPH, a switch point guard may be applied to the outside of the stock rail.

(t) Switch point guards shall be used only in yards and installed so that the distance of the guarding face of the guard to the gage face of the switch point is set at 3-15/16". The gage face of the switch point guard shall be restored by welding once the wear exceeds 1/4" (4-3/16").

§137.0(STM) FROGS

(a) See AREMA Standard Track Plan No. 300 for guidance on the use of frogs.

(b) All metal flow from frogs must be ground promptly and the gage and guard edges of castings rounded. The radius shall be ground to match the original radius and contour of the frog. See AREMA Standard Track Plans or manufacturer’s shop drawing.

(c) New frogs should be ground 30 days following installation. Subsequent grinding will be required monthly for the first several months depending on frog type and service.

(d) Frog points, frog castings, and wheel relief areas (false flange), should be built up by welding to maintain as-new cross section. Spring rail frogs also have false flange relief areas by design. See AREMA Standard Track Plans or manufacturer’s shop drawing.

(e) Worn frogs should be repaired in track by an approved electric welding method and then ground to the correct contour.

(f) Each flangeway in special trackwork must be at least 1-1/2" wide with a 1/8" head radius.

(g) The flangeway depth, measured from a plane across the wheel-bearing area of the frog, may not be less than 1-3/8" in Track Class 1 or less than 1-1/2" in Track Classes 2-5.

(h) If a frog point is chipped, broken, or worn more than 1/2" down and 3" back, the frog should be repaired.

(i) If a frog point is chipped, broken, or worn more than 5/8" down and 6" back, operating speed over that frog may not be more than 10 MPH.

(j) If a riser or insert of a frog is broken out or worn down more than 3/8" below the original contour, operating speed over that frog may not be more than 10 MPH.

(k) Welding repairs on manganese (Mn) steel frogs shall be performed by a welder certified to weld manganese steel.

(l) All frog repairs should be ground to contour. Square corners lead to breakouts into the flangeway.

(m) Frog welding may be prolonged indefinitely by proper grinding practices.

(n) Missing or loose frog bolts shall be retightened or replaced with bolts of correct length and diameter.

(o) All frogs requiring repairs that cannot be made in track shall be removed from track and shipped to the designated repair point.

(p) Frogs shall be supported on effective timber that is fully tamped to minimize wear and damage from train traffic.

§139.0(STM) SPRING RAIL FROGS

(a) Spring frogs have a moveable wing rail that is normally held closed against the body of the frog except when pushed open by a diverging movement. This results in a smoother ride for main line moves.

(b) Spring frogs must be inspected to comply with FRA §213.139.

(c) Recommended practice for the proper installation, inspection, and maintenance:

  (1) Spring frogs must be inspected on foot at least once per week.

  (2) Good surface, line, drainage, and timber condition must be maintained.

  (3) The outer edge of a wheel tread must not be permitted to contact the gage side of the spring wing rail.

  (4) All bolts should be tight:

    (i) Some body bolts are special thin head bolts.

    (ii) Maintenance body bolts (studs) are available for locations where frog must be disassembled to install new bolt.

  (5) Ensure spring wing can move freely.

(d) Spring rail frogs are to be used on industrial tracks that are used infrequently (unless approved by the MassDOT Rail and Transit Division).

(e) The clearance between the hold-down housing and the horn may not be more than 1/8" at the top and 1/8" at the bottom. Other issues to be addressed:

  (1) Wing and point must fit properly. Grind overflow to prevent chipping. Grind gage corner radius to 5/8".

  (2) The spring wing to frog point is designed to have a 3/8" gap at the point. A gap of no more than 3/4" must be maintained.

  (3) Ensure there is sufficient tension on spring:

    (i) The spring nuts should be adjusted to compress the spring 1" (1/4" between spring follower and housing).

    (ii) This results in approximately 600 pounds of force from the spring.

(f) Typically, by design, there is a gap of up to 3/8" between the spring wing rail and frog point within the first 5" of the frog point. It is desirable to maintain contact between the spring wing rail and the remainder of the frog.

  (1) A gap less than 3/4" is to be maintained.

(2) If a gap of 3/4" exists, check the compression of the springs on the wing rail to see if the springs must be adjusted and/or replaced.

(g) Particular attention should be paid to the guard face gage in the point area on the straight side of the turnout. A guard rail protects the straight move through the length of the moveable wing.

(h) The outer edge of a wheel tread must not contact the gage side of a spring wing rail.

(i) When surfacing a spring frog:

(1) Do not jack the frog with production equipment between the toe and heel. This could bend the base plate.

(2) Use hydraulic hand jacks.

(j) Base plate and horns should be lubricated with switch plate lubricant.

(k) The toe of each wing rail must be solidly tamped and fully bolted, or preferably, field welded.

(l) Spring frogs should be ground 30 days after installation. Subsequent grinding may be required monthly for the first several months depending on frog type and service.

(m) Welding of a spring rail frog may only be performed with the permission of the MassDOT Rail and Transit Division.

(1) If a spring rail frog is welded in the field, the first train will operate at Class 1 speeds, freight trains at 10 MPH, and passenger trains at 15 MPH.

(2) The spring rail frog will be re-inspected after the first train before the track will be returned to MAS.

(n) Each spring must have sufficient compression force to hold the spring wing rail against the point rail.

(o) Lubricate spring frog plates with approved lubricant in the Spring, Summer and Fall and “Ice Free Switch” anti-icing agent in the winter (or approved equal).

(p) The opening between the spring wing rail and frog point of spring frog shall be kept free of any debris and snow and ice that may impede the operation of the spring wing rail.

§141.0(STM) SELF-GUARDED FROGS

(a) Self-guarded frogs shall be used in non-main tracks where the speed does not exceed 15 MPH.

(b) If, because of wear, repairs need to be made to the guarding face of a self-guarded frog:

(1) The raised guard face of a self-guarded frog may not be worn horizontally more than 3/8".

(2) Repairs require the use of a contour gauge (see §150.1(M), “Inspection Tools”).

(3) The track should be taken out of service.

(4) When repairing the guard face of a self-guarded frog, the build-up of weld material must be made from the top down to prevent wheel climb

(5) When repairs are made to a self-guarded frog, the guard face must be restored before rebuilding the point. This practice will ensure that the wheel does not strike the rebuilt frog point.

§142.0(STM) GUARD RAILS

§142.1(STM) Guard Rails - General

Guard rails shall be furnished in accordance with MBTA Standard Plan Book, AREMA Standard Plan Book, or as approved by the MassDOT Rail and Transit Division.

§142.2(STM) Guard Rails - Use

(a) Guard rails used with No. 15 spring frogs shall be a minimum of 16'-0" in length. Guard rails used with frogs of lesser number shall be a minimum of 13'-0" in length.

(b) Guard rails used with No. 10 spring frogs shall be a minimum of 16'-0" in length, or as approved by the MassDOT Rail and Transit Division.

(c) Guard rails installed in accordance with previous standard practice may be continued in general use until their replacement becomes necessary.

(d) Relay quality hook flange guard rails must only be reinstalled in other than main tracks.

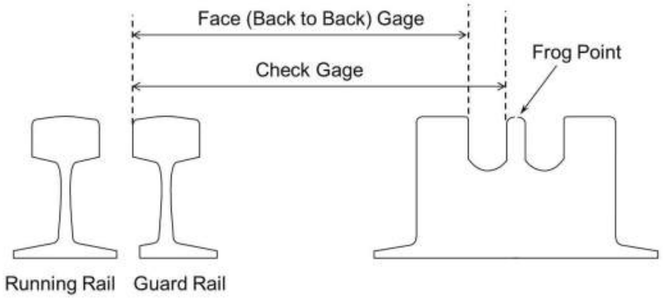
§143.0(STM) FROG GUARD RAIL AND GUARD FACES; GAGE

(a) If possible, when performing trackwork maintenance, repairs shall be made to restore the installation dimensions of guard rails:

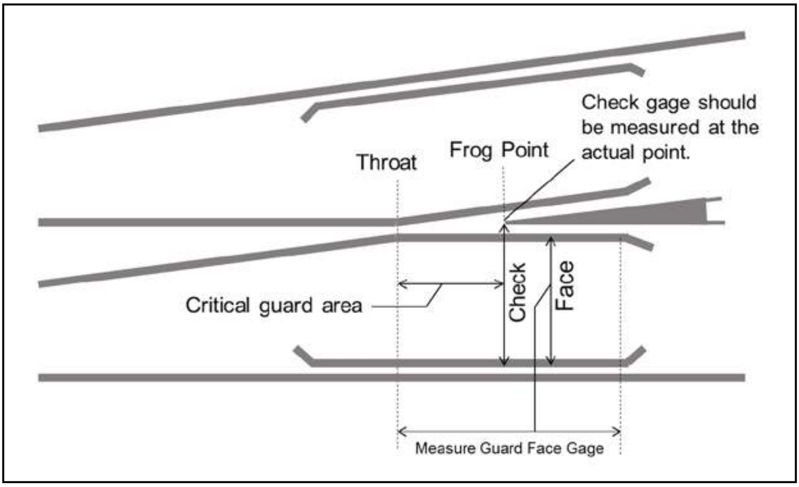
Track gage	56-1/2"
Guard check gage (may not be less than)	54-5/8"
Guard face gage (back to back) (may not be more than)	52-3/4"

(b) Maintenance limits contained in Paragraph (a) are more restrictive than those found in FRA §213.143.

(c) See the following diagrams showing guard check gage and guard face measurement locations.



Guard Check and Guard Face Gage



Guard Check and Guard Face Gage Measurement Locations

§144.0(STM) INSTALLATION OF SPECIAL TRACKWORK GUIDELINES

(a) Trackwork constructed in track, or at the site, shall be built to, and perform to the MBTA Standard Track Plans, AREMA Standard Track Plans, or as approved by the MassDOT Railroad Transit Division.

(b) Turnouts and crossovers shall not be placed in curves or spirals without the approval of the MassDOT Rail and Transit Division.

(c) Pre-plated, pre-assembled switch timber and pre-fabricated switch nose panels (if truckable), are preferred.

(d) Care must be used in unloading and handling all trackwork, timber, and turnouts. This includes handling and unloading from flatbed cars and trucks and assembling and loading onto transport cars.

(e) A minimum 12" bed of clean-bottom compacted ballast shall be provided with good drainage. See MBTA Standard Plan Nos. 1000 and 1002.

  (1) If roadbed materials (sub-ballast and sub-grade) are inadequate, an 8" layer of compacted sub-ballast shall be installed; or

  (2) A 5" layer of compacted hot-mix asphalt under-layment as per MBTA Standard Plan No. 1030; or

  (3) A Geo-Web (or approved equal) sized appropriately for the field conditions (4", 6", or 8") may be used as determined by the MassDOT Rail and Transit Division.

(f) When practicable, special trackwork should be completely installed with switches connected to their operating mechanisms and properly adjusted before trains are permitted to move over the trackwork.

(g) Care must be used when installing trackwork panels to prevent rail bending, tie splitting, or tie cracking, as well as bending and/or breaking fasteners and OTM.

(h) When installing special trackwork panels, bottom ballast should be furnished and installed and compacted level to within 2" to 4" of final bottom of tie grade. The final lift shall be nominal 1-1/2". (Ballast bagging or blocking can be used when undercutting or in emergencies.)

(i) Initial surfacing lifts for special trackwork shall be limited to 2" increments. This size lift helps prevent tie breakage, and the bending of rail and plates in spring and moveable point frogs. The final lift shall be a nominal 1-1/2".

(j) Where only one switch rail (closed point) has been installed in a main track turnout in existing main track, and it is necessary to move trains over the turnout, the following precautions must be taken:

  (1) All switch plates on the turnout side must be in the correct position and clipped and/or fully fastened.

  (2) The switch rail must be securely held against its stock rail by driving a spike in each of the first two ties back of the point and, where possible, spikes must pass through holes in the switch plates.

  (3) The switch point must be secured to the stock rail by standard clamping devices.

  (4) Unconnected ends of lead rails, or the toe of the frog, must be protected by a tapered wedge fastened to the tie to protect against dragging equipment.

  (5) The free end of stock rail must be fastened down to prevent movement and a tapered wedge fastened to prevent against dragging equipment.

  (6) Facing point train movements shall only be made under a 10 MPH temporary speed restriction unless point detection is provided.

(k) If both switch rails have been installed, but not properly connected to the switch operating mechanism, the following must be done before trains are permitted to move over the main track turnout:

  (1) Switch rods must be installed.

  (2) The main track switch rail must be secured against its stock rail, as required above.

  (3) The diverting switch rail (open point) must be blocked by driving a wooden wedge, not less than 18" long, between the switch rail and the stock rail.

  (4) On wood ties, a wedge must be secured in place by means of a lag screw or heavy nail through one clip bolt hole and a piece of wood placed against the end of the wedge and spiked to the first and second ties ahead of the point.

  (5) Unless the curved lead has been installed and spiked or clipped to prevent movement, a connecting rail shall be fastened to the heel of the open switch rail and moved away from the running rail so as to provide at least 5" clearance between rail heads.

  (6) Facing point train movements shall only be made under a 10 MPH temporary speed restriction unless point detection is provided.

(l) The main track guard rail must be correctly placed and clipped or spiked if the frog has been installed.

(m) Unconnected ends of lead rails or the toe of the frog must be protected by a riser wedge fastened to the tie to protect against dragging equipment.

(n) Where track is signaled, a switch circuit controller shall be installed, tested and functioning, by a signal employee of the Operating Railroad Company.

Subpart F – Scheduled Maintenance Activities

§150.0(STM) DESCRIPTION OF SCHEDULED MAINTENANCE ACTIVITIES TO BE PERFORMED

Refer to the table in §3.0(STM) for the list of major trackwork activities to be performed by the Operating Railroad Company.

§151.0(STM) RECORD OF TRACKWORK DISTURBANCE IN CWR TERRITORY

(a) Maintenance activities performed in trackwork installed in CWR track can cause a change in the rail neutral temperature (RNT) of the CWR and cause track instability in and around the special trackwork.

(b) MOW employees in charge of, or responsible for maintenance work performed in and around special trackwork in CWR track, shall be thoroughly familiar with and understand and comply with Appendix A, “Continuous Welded Rail (CWR) Procedures.”

§152.0(STM) LUBRICATION OF SWITCHES AND FROGS

(a) Switch and spring frog plates shall be cleaned and lubricated as necessary.

(b) The Signal Maintainer has the overall responsibility to lubricate powered switches and derails in signaled track.

(c) The Track Department has the responsibility to lubricate all other switches, derails, and spring frogs with approved seasonal lubricants.

§152.1(STM) Lubrication of New Switch Points

(a) New switch points shall be greased after installation.

    (1) Special attention should be paid to lubricate the gage face of the diverging point from point of switch to point of frog.

(b) Existing switch points that show indication of wear should be carefully lubricated frequently on the gage face so as to prevent migration to the top of rail, as well as excessive ground and ballast contamination.

§156.0(STM) SURFACING (SPOT TAMPING) - GENERAL

(a) Spot tamping (less than 200') is required to restore the surface and line when deviations approach the alignment and surface maintenance limits given in §§55.0(M) and 63.0(M).

(b) Spot tamping is required to eliminate the excessive deflection and pumping of ties which:

    (1) Overstresses clips causing premature failure or backing out of clips.

    (2) Increases abrasion of the wood ties.

    (3) Fouls the ballast.

    (4) Increases ballast abrasion and wear.

    (5) Changes the load distribution over the length of the tie which, in some cases, may overstress the tie.

(c) Tamping should be performed in such a manner as to prevent the centerbinding of timber and ties.

(d) In wood tie turnouts, head block and movement ties may require tamping by hand to provide full support of the long timber.

(e) When spot surfacing in welded rail territory, see Appendix A, “Continuous Welded Rail (CWR) Procedures.”

§157.0(STM) OUT-OF-FACE SURFACING AND ALIGNMENT

(a) Out-of-face surfacing (greater than 200') shall be accomplished by multiple tool switch tampers, ballast stabilizers, and ballast regulators.

(b) Out-of-face surfacing is usually required when there are multiple spots to be surfaced that are greater than 200' in length.

(c) Out-of-face surfacing is required to restore the overall surface and line when deviations approach the alignment and surface maintenance limits given in §§55.0(M) and 63.0(M).

(d) The Operating Railroad Company shall plan any out-of-face surfacing program for trackwork. The Operating Railroad Company MOW personnel shall make use of information on the Track Inspection Report, Special Track Inspection Report, Monthly Switch Inspection Report, track geometry car readings (if available) and train rides when planning the out-of-face surfacing program.

(e) Out-of-face surfacing and aligning of CWR track should be avoided:

  (1) When the ambient air temperature is 80°F, or rail temperature is 100°F, or above;

  (2) Anytime there is an ambient air temperature of 40°F, or below, for a 24-hour period. To surface and align track below the above temperature requires the approval of MassDOT Rail and Transit Division.

  (3) Any other time when questionable track conditions exist that will not safely support surface and alignment of track.

(f) When out-of-face surfacing in welded rail territory, see Appendix A, “Continuous Welded Rail (CWR) Procedures.”

§158.0(STM) SPOT REPLACEMENT OF MAJOR COMPONENTS

(a) During the useful life of special trackwork, it may be required to replace major components and systems as part of a programmed maintenance activity. The major components include, but are not limited to:

  (1) Switch points, stock rails, and/or point protectors.

  (2) Switch plates or tie plates and clips and fasteners.

  (3) Frogs and guard rails.

  (4) Bolt assemblies.

  (5) Closure rails (associated joint and insulated joints).

  (6) Switch timber and headblock ties.

  (7) Switch stands, switch machines, and/or derails.

  (8) Switch targets, handles, rods, and cotter pins.

(b) The replacement of major components is based on:

  (1) The physical condition of the component.

  (2) The amount of measured wear on the component compared to an established maximum “wear limit” as given in this Part.

  (3) The ability of the component to sustain MAS and meet the operational requirements of the railroad.

  (4) Lost motion of any moving switch parts.

(c) When changing major components, all work performed shall be reported on the daily Track Inspection Report and be available to the MassDOT Rail and Transit for review.

§159.0(STM) SPOT RAIL REPLACEMENT

(a) Rail replacement shall be performed on an as-needed basis as traffic and local conditions warrant.

(b) The replacement of rail is based on:

  (1) The age and physical condition of the rail.

  (2) The existence of a rail defect as defined in FRA §213.113.

  (3) The amount of measured wear on the rail compared to an established “wear limit” for that rail as given in §113.2(M).

  (4) Switch point to stock rail wear limits as given in this Part take precedence over the maintenance limits given in §113.2(M).

(c) A “Rail Failure in Main Track Report” must be filled out and available for MassDOT Rail and Transit Division to review every time a rail is changed.

§160.0(STM) BOLTS AND LOCK WASHERS

(a) During the useful life of trackwork there may be a requirement to replace broken or defective bolts and/or washers in frogs, heel blocks, and at permanently bolted joints.

(b) When evaluating the performance of bolts:

  (1) Verify that the bolt is of the correct diameter, length, and type.

  (2) Visually inspect the performance of the bolt and washer under load.

  (3) Visually inspect the joint or appliance and look for signs of vertical movement, batter, crushing, excessive flow, or excessive wear in the component affixed with the bolt and washer.

  (4) Visually inspect the condition of crib ballast and general line and surface at that location.

  (5) Visually inspect the condition of ties, plates, and clips at bolted locations.

(c) When changing a bolt in a joint, frog, or in a switch point, tighten all other bolts in the immediate vicinity.

(d) The preferred method of tightening new bolts is with a torque wrench and multiplier that applies the recommended level of torque (foot-pounds) to the bolt. See the following tables.

Recommended Torque Values in ft.-lb. to Produce the Minimum Specified Tension in Society for Automotive Engineers (SAE) Grade 5 Bolts

Bolt Diameter	Min Tension (lb.)	Lubricated Condition[1]	Non-Lubricated Condition[1]
1/2"	12,000	80	105
5/8"	18,000	155	210
3/4"	28,000	275	370
7/8"	39,000	450	600
1"	51,000	670	800
1-1/8"	56,000	825	1,100
1-1/4"	71,000	1,165	1,550
1-3/8"	85,000	1,535	2,040

Note:

(1) Lubricated torque valves shall be achieved by applying a metal-based lubricant to the bolt threads.

Recommended Torque Values in ft.-lb. to Produce the Minimum Specified Tension in SAE Grade 8 Bolts

Bolt Diameter	Min Tension (lb.)	Lubricated Condition[1]	Non-Lubricated Condition[1]
1/2"	15,000	100	130
5/8"	24,000	195	265
3/4"	35,000	345	460
7/8"	49,000	565	750
1"	64,000	840	1,120
1-1/8"	80,000	1,180	1,575
1-1/4"	102,000	1,675	2,230
1-3/8"	121,000	2,185	2,910

Note:
(1) Lubricated torque valves shall be achieved by applying a metal-based lubricant to the bolt threads.

§161.0(STM) FASTENING SYSTEMS

(a) During the useful life of trackwork, it may be required to change rail fasteners (e.g., clips or spikes or screw spikes) as a normal maintenance activity.

(b) The replacement of fasteners is based on:

  (1) The physical condition of the fastener (worn or corroded and/or broken or missing).

  (2) The ability of the fastener and the fastening system to minimize the horizontal and vertical movement, as well as the longitudinal movement of the rail or components (e.g., switch points, frogs and guard rail), and to sustain maximum authorized speed.

(c) When evaluating the performance of fasteners, the Foreman shall:

  (1) Verify that the correct type of fastener is being used.

  (2) Visually inspect the fastener for cracks and breaks.

  (3) Visually inspect the fastener to see if they are overdriven.

  (4) Visually inspect the components being fastened and look for signs of vertical or horizontal movement or excessive wear.

(d) Clips that have repeatedly backed-out or fallen-out should be replaced with new clips and not reused.

Subpart G – Turnouts in Signalized Track

§170.0(STM) GENERAL PROCEDURES FOR WORK ON TURNOUTS IN SIGNALED TERRITORY

(a) When adjusting or working on a main track turnout in signaled territory:

(1) Notify the Signal Maintainer.

(2) Obtain foul time, track time or other form of Roadway Worker Protection (RWP) from the dispatcher.

(3) Hold a job briefing.

(4) Block the switch point.

(5) Perform the work.

(6) Remove blocking.

(7) Perform obstruction test (by Signal Maintainer).

(8) Make sure hand-thrown turnout is aligned and locked with an approved lock in the normal position before returning to service.

(9) Return track to service.

Subpart H – Mechanisms, Appliances, and Devices

§200.0(STM) SWITCH OPERATING MECHANISMS

§200.1(STM) Use of Mechanisms

(a) Switches shall be operated by approved types of mechanisms as follows:

  (1) Power mechanisms as approved by the MassDOT Rail and Transit Divisio**n** after recommendation by the Signal Department.

  (2) Spring switches: Manually operated switch mechanisms, which are supplemented by slow-acting spring devices that permit wheels to trail through switches set for the opposite route, may be used with the approval of the MassDOT Rail and Transit Division.

  (3) Approved type of new installation switch stands (unless approved by MassDOT Rail and Transit Division), are: Racor Model 36EH (High Mast) for mainlines and Racor Model 36E for yards.

  (4) Manual operated mechanisms shall use the “back saver” and/or “triangular hand level” handles for new installations.

§200.2(STM) Installation of Switch Stands

(a) Manually operated switch stands shall be placed so that the operating rod is in tension when the switch is set in normal position.

(b) Whenever possible, the switch stand handle shall be positioned facing the frog when the switch is in the normal position.

(c) Where crossover switches are protected by signals, a switch locking arrangement shall be provided.

(d) Switch stands for all tracks shall be located to serve the safety and efficiency of employees.

§205.0(STM) SWITCH POINT POSITION INDICATORS (TARGETS)

§205.1(STM) General

(a) Where required, indicators shall be provided on all non-interlocked switches to give a clear and distinct indication of the position of the switch points

(b) Switch point targets shall be reflectorized. The height of the centerline of the target shall not exceed 20" above the track ties. Targets higher than this are called “high targets.”

(c) Generally, high targets with the EH36 high stand are used on all main track.

(d) Generally, low targets are used in yards and at locations on main tracks where clearance precludes the use of a high stand.

§205.2(STM) Installation of Position Indicators

Targets shall be set at right angles to the track and perpendicular to the headblock ties.

§205.3(STM) Maintenance

Switch targets should be kept clean to provide uniform brightness and visibility.

§205.4(STM) Position Indication

(a) In order to give a clear and distinct indication of the position of non-interlocked switch points, colored targets shall be provided, in addition to the switch stands.

(b) Target colors are given in the Northeast Operating Rule Advisory Committee (NORAC) Rule Book (Rule 104H).

 (1) Where switch targets are used, a green or white banner indicates normal position of the switch, and a red or yellow banner indicates reverse position.

 (2) Green and white banners are used on main tracks, and red and yellow banners are used on other than main tracks and yards.

§205.5(STM) Distance from Rail for Switch Stands and Switch Point Targets

(a) Switch stands, not between tracks, must be placed so that the distance from the gage of the nearest rail to the center of the spindle with a low mast is 4'-1" and with a high mast is 7'-0".

(b) Low target masts placed between tracks must be installed as follows:

Track Center Distance (at least)	**Minimum Distance From Gage of Nearest Rail to Center of Spindle**
12'-2" but less than 13'	3'-8-3/4"
13' or greater	4'-1

(c) All powered switch machines shall be installed as per Signal Department Instructions.

§210.0(STM) SWITCH STAND MAINTENANCE

(a) Switches, switch stands, and operating rods must be examined frequently. Broken, damaged, or missing parts shall be replaced immediately.

(b) Regular inspection shall be in accordance with FRA §213.233, and if necessary, corrective action must be taken immediately.

(c) Worn switch latches must be replaced before the wear is sufficient to permit the switch lever to be thrown without manually releasing the latch (keeper).

(d) Special attention should be taken to ensure that the cotter pin is maintained at the clevis location at the base of the switch stand and at the connection to the No. 1 rod (FRA §213.135).

§220.0(STM) SWITCH LOCKS

(a) At all main track switches, throw levers of switch stands, shall be secured by two latches (for normal and reverse positions), and locked by a standard switch lock. The lock is to be fastened by a chain to the switch stand, or tie, so that the switch can only be locked in the normal position.

(b) The throw levers of switch stands in other than main or secondary track, shall be provided with latches, but shall be provided with padlocks only when required.

(c) The standard switch lock used by the Operating Railroad Company is to be approved by MassDOT Rail and Transit Division.

(d) Recommended operating and cleaning procedures for switch locks are:

 (1) Unlock the padlock and open the shackle to soak and wash the lock thoroughly in the recommended cleaner (LPS Instant Super Cleaner/Degreaser) or equivalent. This will remove any oil, grease, and their foreign matter from the

area of the locking balls. If feasible, use of an ultrasonic cleaning tank is advised. This type of device produces superior results.

(2) If cleaning by hand, use a squirt bottle to force the cleaning solution into the locking ball cavities. This will complete the cleaning and flushing of the locking ball area.

(3) Do not oil, grease, or graphite the lock. Lubricate only with a light, non-grease substance, such as LPS #1 Greaseless Lubricant.

§300.0(STM) DERAILS

§300.1(STM) Position of Derails

The "normal" position of a derail shall be to derail wheels of rolling equipment away from the main track or structure. The "reverse" position shall permit the unobstructed movement of equipment.

§300.2(STM) Use of Derails

(a) Derails shall be used on all tracks.

(b) Selection of derail type:

  (1) A **double switch point derail** will be used at the following locations:

    (i) Where the track on which the derail is to be placed descends towards the main track requiring protection.

    (ii) On all tracks, even if descending away from the main track, if any portion of that track is higher in elevation than the track at the derail location.

    (iii) Where the industry moves rail cars using on or off track equipment or by gravity or with a car puller.

    (iv) On tracks used for loading, unloading, or storage of cars containing hazardous (hazmat) materials as defined in the U.S. Hazardous Material Instructions for Rail.

    (v) Where operating conditions demand positive derailing protection.

  (2) A **sliding rail** may be used where track on which the derail is to be placed is level or descends away from the main track requiring protection.

  (3) A **hinge derail** may be used in yard areas where a derail operating stand would adversely impact the normal walking path.

  (4) A **portable derail** is used to provide protection to personnel working on or about a track to make work limits inaccessible (see RWP Rules for Operating Railroad Company), or to protect equipment stored temporarily on a track not normally used for storage.

§300.3(STM) Types of Derails

(a) Derails are generally of three kinds: the "split switch," the "sliding block," and the "hinged block" type.

(b) Where derails are prescribed, the split switch type shall be used on side tracks or industrial tracks as follows:

  (1) At all locations where the side track or industrial track is on a descending grade to the main track.

  (2) Within interlocking limits, in main tracks, in secondary tracks, and as designated by the MassDOT Rail and Transit Division.

  (3) In tracks where it is possible for the speed of rolling equipment to exceed 15 MPH.

(c) Approved sliding block type derails shall be used in other than main tracks with speeds less than 15 MPH at other locations than those given in Paragraph (b) above.

(d) Hinged block derails are usually used in yard limits or in conjunction with Roadway Worker Protection (RWP) practices.

§300.4(STM) Installation of Derails

(a) A derail shall be placed a sufficient distance back of the clearance point, not less than 12', to ensure that derailed rolling equipment will not foul the main or other protected track.

(b) When using single point split switch derails, a deflecting rail must be used.

(c) Where deflecting rails are used:

 (1) The minimum length shall be 18'.

 (2) The nearest end shall be 10' from the derail.

 (3) The flangeway opening at the end nearest to the derail shall be 4".

 (4) The end farthest from the derail shall be set to provide a 12" clear opening between running rail opposite the derail and the deflecting rail.

 (5) The deflecting rail shall be of a section and weight that is not greater than that of the running rails, and, preferably less.

 (6) The deflecting rail should be spiked to every tie with two rail holding spikes, one on each side of the rail base.

 (7) Deflecting rails shall be fully anchored or otherwise secured to ensure that they do not move longitudinally.

 (8) Derails are to be installed in accordance with manufacturer's recommendations.

 (9) Existing installations of derails need not be changed to meet these provisions until renewals are necessary, or unless so ordered by the MassDOT Rail and Transit Division.

§300.5(STM) Operation of Derails

(a) Lever stands of approved types may be used for operating derails. Where practicable, the distance from the center line of the lever stand spindle to the gage of the nearest rail shall be at least 50".

(b) Derails shall be provided with standard switch padlocks fastened to the tie by a chain and staple, so that the lever or derail can be locked only in the normal position.

§300.6(STM) Maintenance of Derails

(a) Sliding block or hinged block derails shall be painted yellow.

(b) Dirt and weeds must be kept away from derails.

(c) Ballast, snow, and ice must be kept away from derails.

Subpart I – Schematics / Photographs

(a) Schematics and photos of trackwork are provided in the MW-1 to illustrate the name, location, and general arrangement of trackwork types and major components.

(b) Trackwork types and components are shown below in photos and drawings and include:

1. Conventional Turnouts

2a. Railbound Manganese Frog (RBM)

2b. Railbound Manganese Frog – Section X-X

3a. Self-Guarded Manganese Frog

3b Self-Guarded Frog – Section Y-Y

4a. Spring Frog Arrangement

4b. Spring Frog Details

5a. Guard Rail - Hook Flange Type

5b. Guard Rail - Hook Flange Type – Section A-A

6a. Hinged Derail

6b. Sliding Block Derail

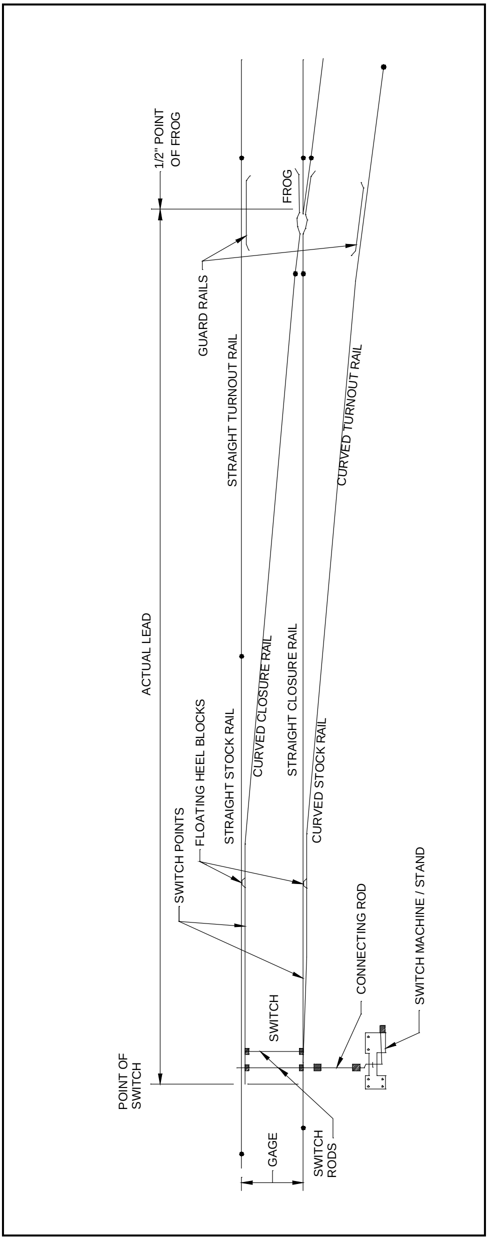
6c. Double Switch Point Derail

7a. Switch Stand Type 36

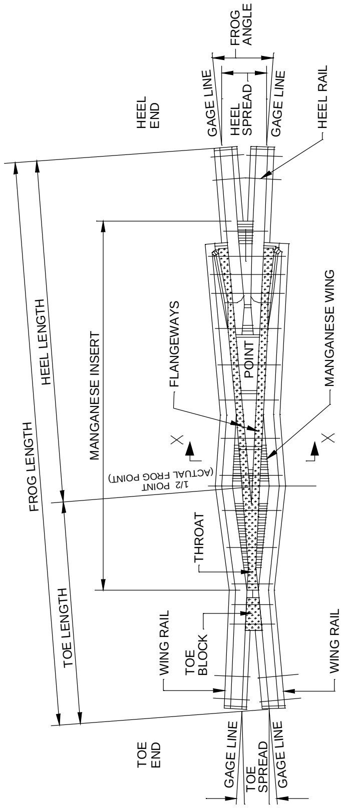
7b. Switch Stand Type 36

8a. Western-Cullen Type Bumping Post

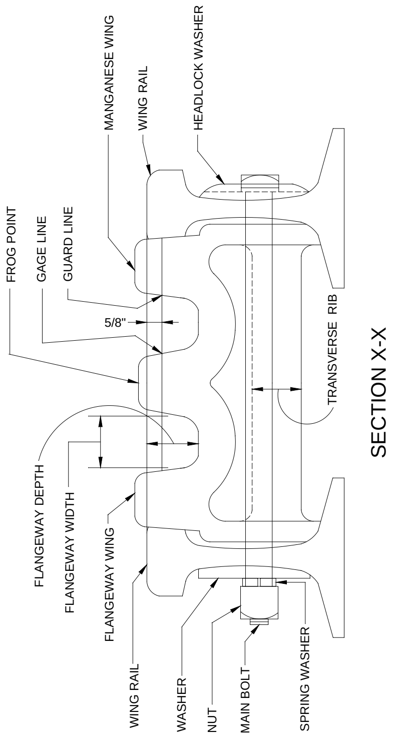
8b. High Energy Hydraulic Bumping Post



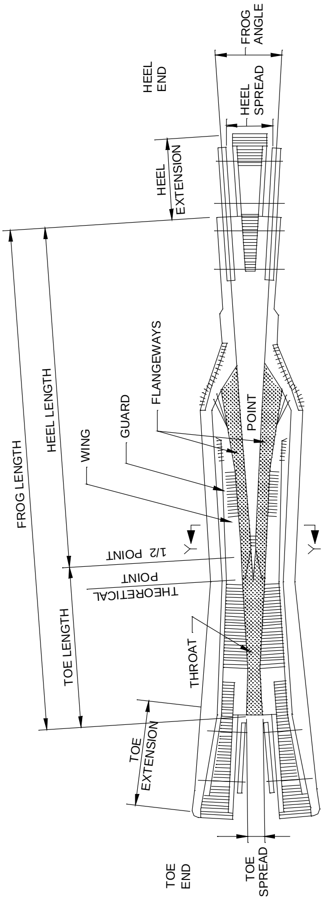
1. Conventional Turnout



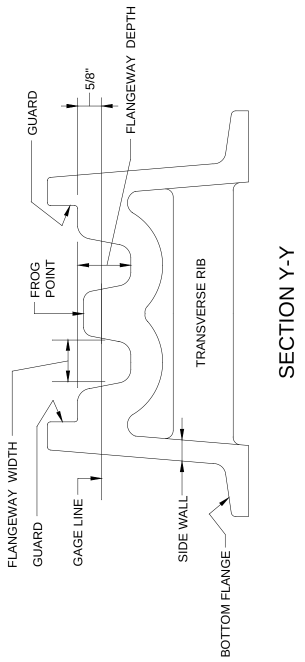
2a. Railbound Manganese Frog (RBM)



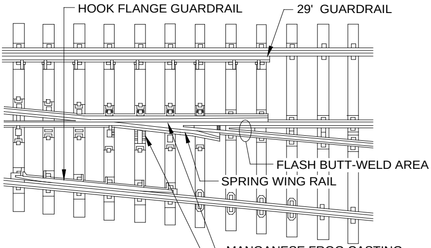
2b. Railbound Manganese Frog – Section X-X



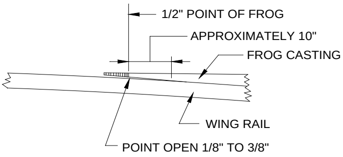
3a. Self-Guarded Manganese Frog



3b. Self-Guarded Frog – Section Y-Y

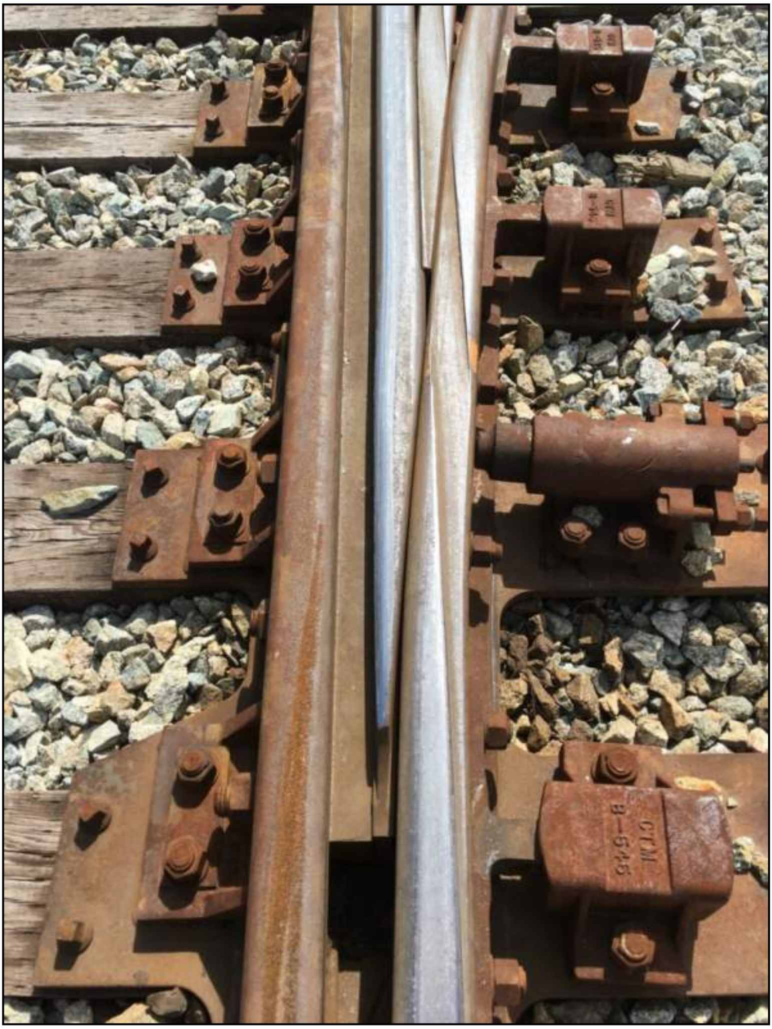


MANGANESE SPRING FR0G LAYOUT

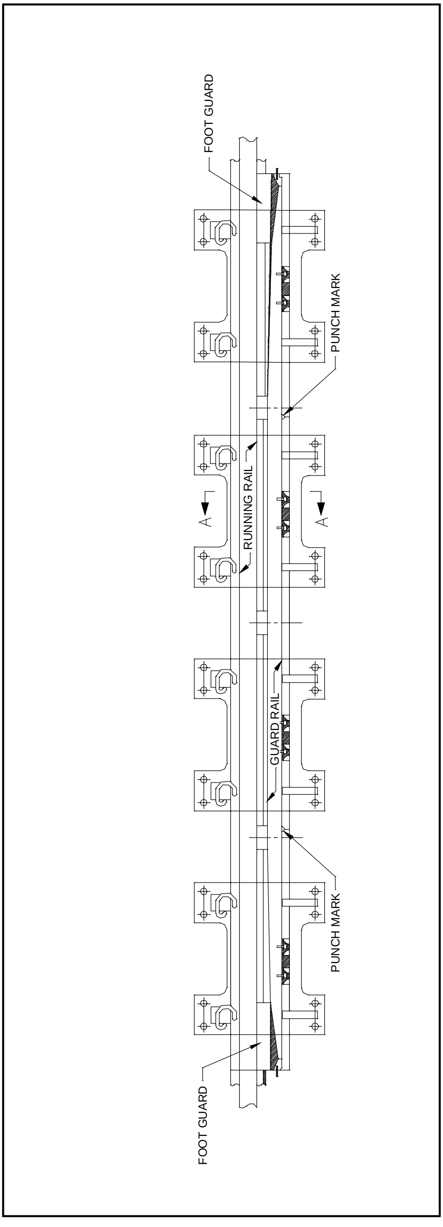


DETAIL OF SPRING FROG POINT AREA

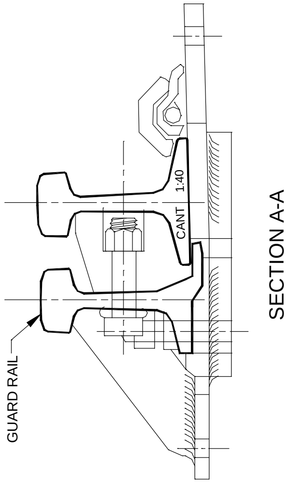
4a. Spring Frog Arrangement



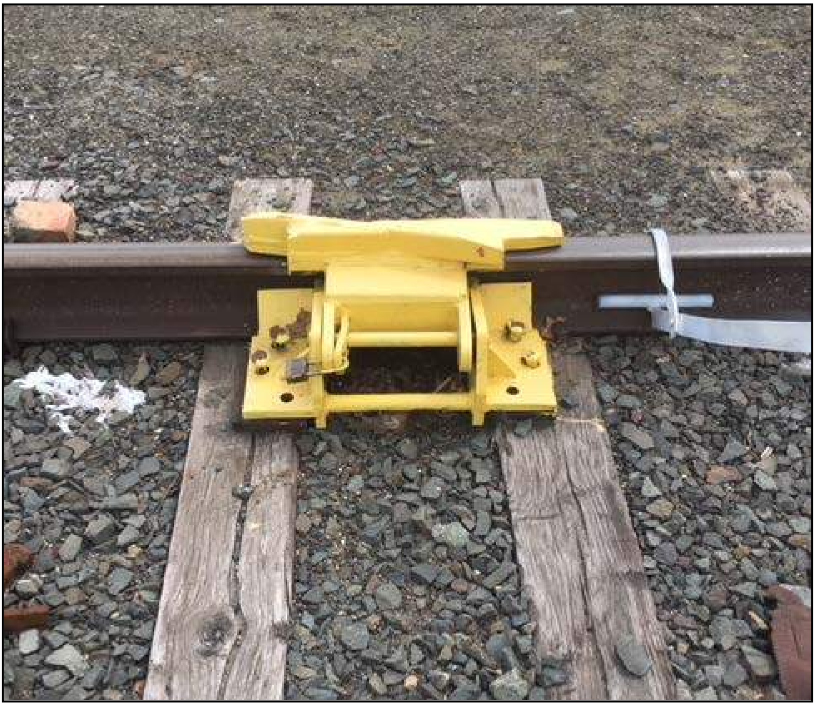
4b. Spring Frog Details



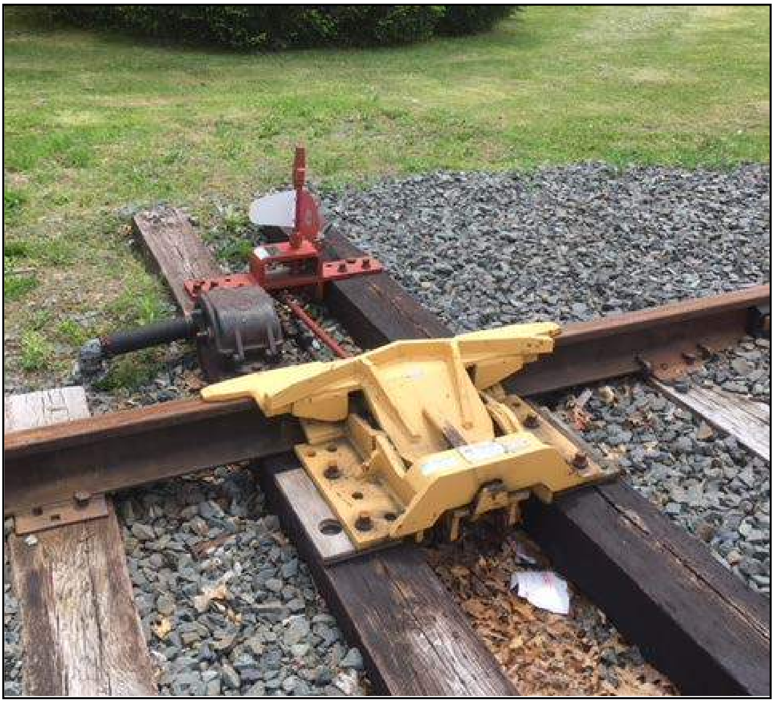
5a. Guard Rail – Hook Flange Type



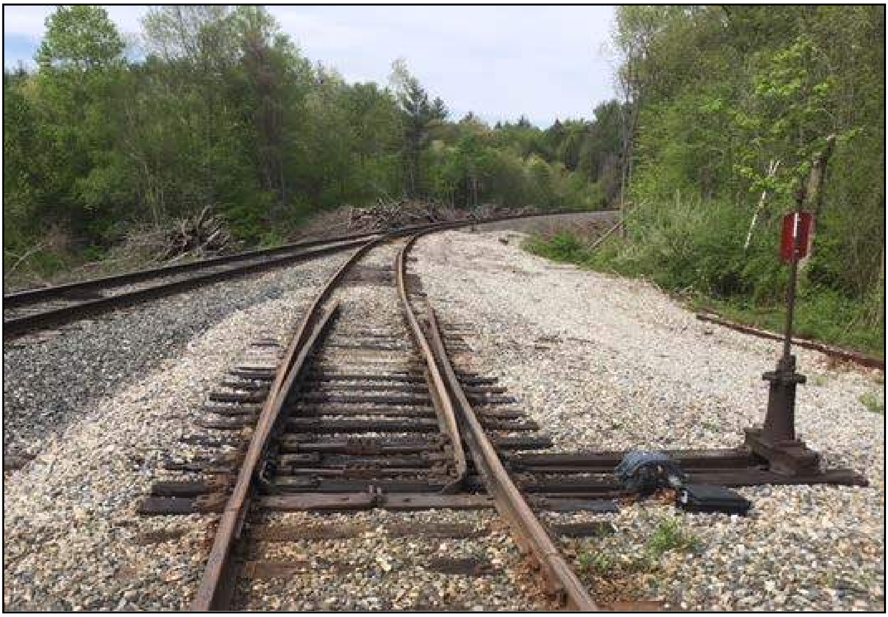
5b. Guard Rail – Hook Flange Type – Section A-A



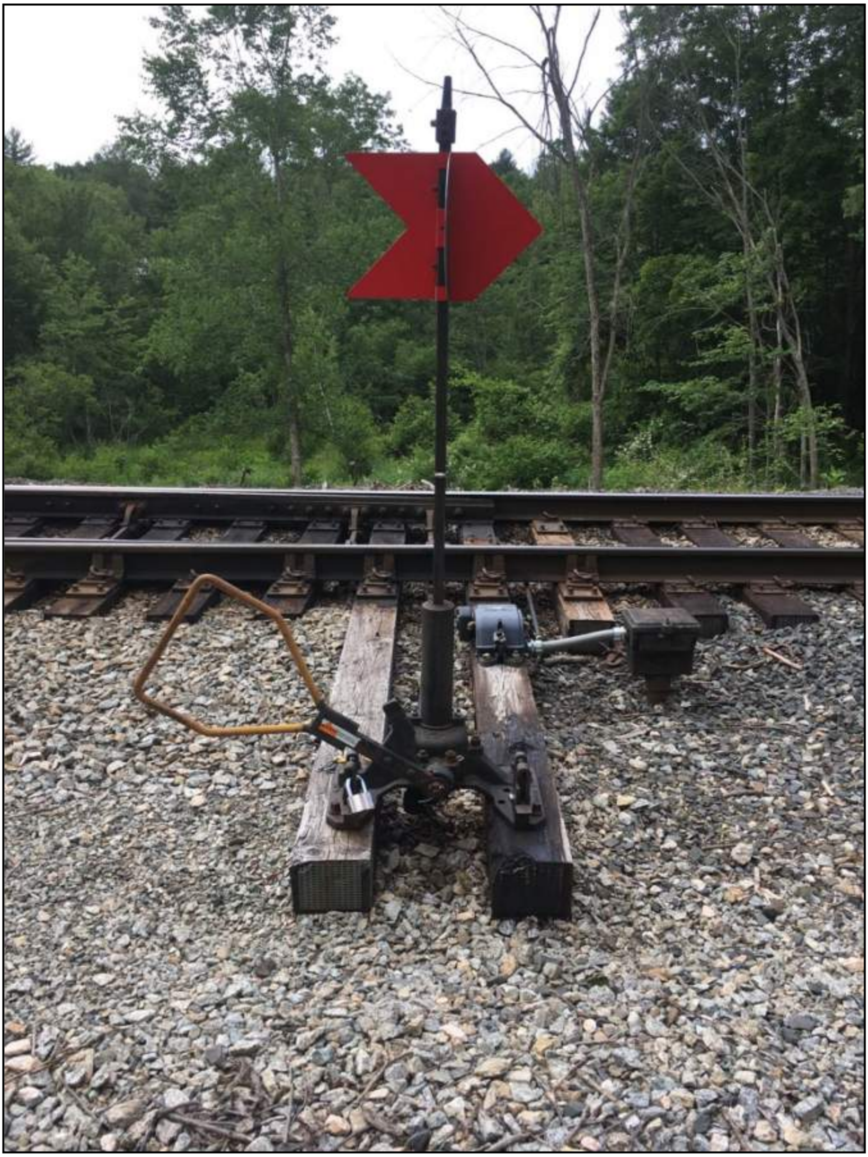
6a. Hinged Derail



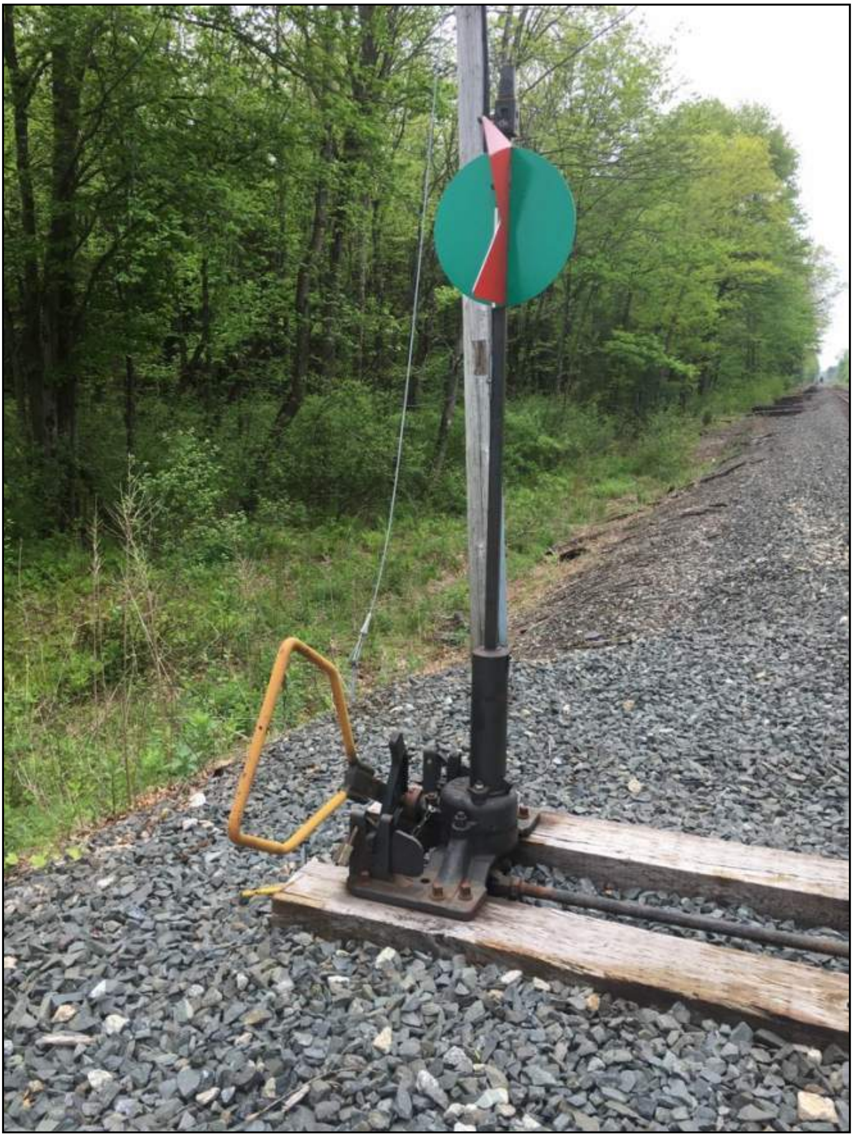
6b. Sliding Block Derail



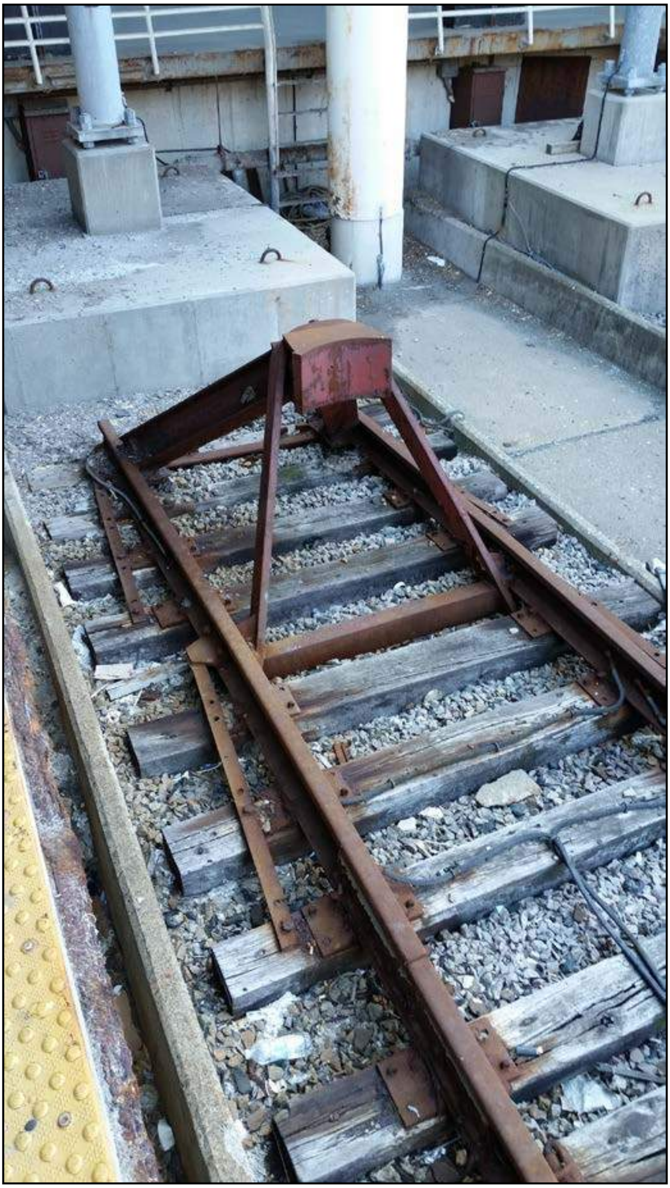
6c. Double Switch Point Derail



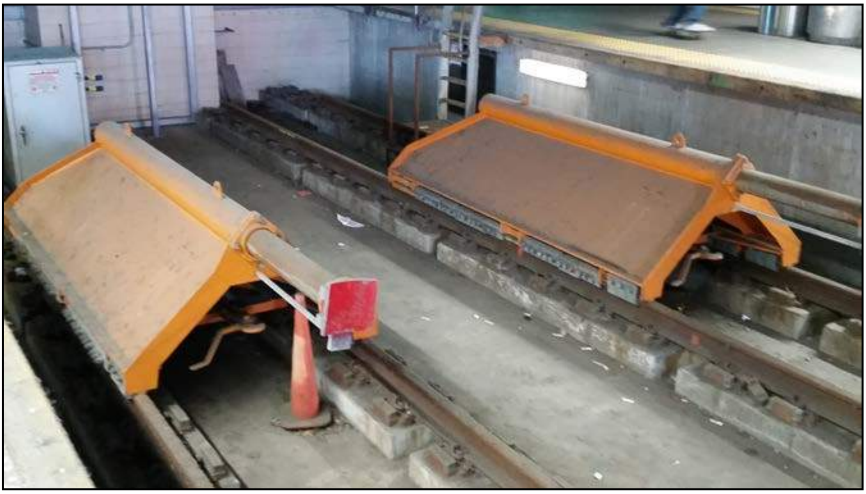
7a. Switch Stand Type 36



7b. Switch Stand Type 36



8a. Western-Cullen Type Bumping Post



8b. High Energy Hydraulic Bumping Post

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Massachusetts Department of Transportation
Rail & Transit Division

APPENDIX A

CONTINUOUS WELDED RAIL (CWR) PROCEDURES

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APPENDIX A

MINIMUM RECOMMENDED REQUIREMENTS TO BE INCLUDED IN THE OPERATING RAILROAD'S CWR PLAN CONTENTS AS PER FRA 213.118 & 213.119

1.0 APPLICABILITY

The installation, adjustment, maintenance and inspection of continuous welded rail (CWR) shall be performed in accordance with FRA Part 213, Track Safety Standard's §213.118 and §213.119. As such, the requirements herein are based on the FRA/Rail Safety Advisory Committee (RSAC) Generic Policy document provided to the U.S. railroads as a part of the October 2009 enacted FRA safety rule and are based on current best practice guidelines on CWR in providing minimum requirements on CWR.

These MassDOT procedures are aimed to aid and assist the Railroad Operating Companies to maintain MassDOT-owned tracks in a safe and efficient manner. Performing CWR installation, maintenance, adjustment and inspection in accordance with the provisions and requirements stipulated herein will meet the expectations of the Commonwealth and provide uniform practice between the different properties of the Railroad Operating Companies.

This document details MassDOT's policy on installing, adjusting, maintaining, and inspecting CWR track. Each section details how the individual MassDOT rail operator applies its standards and procedures to comply with FRA standards.

1.1 INTRODUCTION

(a) Continuous Welded Rail (CWR) is defined as any rail that contains no joints in 400' or greater in length. This document will serve as the recommended practice for the installation, adjustment, maintenance, and inspection of CWR. Rail that is installed as CWR and subsequently has additional joints installed within the limits of the rail will still be considered as CWR, and subject to the requirements of this document. Track laid with CWR is referred to as "CWR Track." Any employee who installs, adjusts, maintains and inspects CWR must have a copy of their approved FRA Plan (§213.118 and 213.119).

(b) If the Operating Railroad cannot comply with the minimum recommended requirements found in Appendix A, they shall immediately notify MassDOT Rail and Transit Division.

(c) Preparation and care:

  (1) **Programmed tie renewals shall be completed in advance of rail laying.**

  (2) **Track shall be surfaced and aligned prior to CWR installation.**

  (3) Track to be laid with CWR must have standard ballast section (shoulders and cribs) for welded rail before CWR is installed.

  (4) Rails should be examined for defects and damage prior to laying in track.

  (5) At the time of installation, care should be taken so that no damage to rail or fastenings will result.

  (6) All ties, to include loose ties, should be tamped to full bearing under the rail, with a small tamper, during rail laying operations ahead of the spiker.

2.0 FABRICATION AND DISTRIBUTION

(a) Unloading:

(1) CWR should be unloaded as close as possible to the position where it is to be installed with a minimum of further handling, giving special attention to accurately locating the ends of CWR.

(2) CWR should be placed parallel with the track and base down, avoiding excessive bending or damage, making use of suitable mechanical equipment when available. Care should be taken to avoid placing rails on drainage facilities and other civil structures.

(3) CWR ends must be bypassed.

(b) Use of CWR on MassDOT Rail and Transit Division owned lines:

(1) CWR fabricated by an approved process may be laid without restriction in fully ballasted main and secondary tracks. When welded rail is laid on curves, particularly those sharper than 6 degrees, it must be closely monitored for any indication of movement up out of the plates.

(2) CWR may be laid across open deck bridges where bridge ties are spaced with timber blocks between ties provided that the following conditions are satisfied:

(i) The anchoring of open deck bridges shall be approved by the Operating Railroad's Bridge Engineer.

(ii) Per MBTA Standard Plan, all ties and blocks in a panel are tightly jacked and fastened together with guard timbers or spacing bars secured by lag screws in every tie. See latest MBTA Standard Plan.

(iii) Per MBTA Standard Plan, bridge ties are securely fastened to steel structure by means of a hook bolts, tie anchors, or other approved holding device. See latest MBTA Standard Plan.

(iv) The bridge structure is properly anchored to abutments and piers to prevent any movement other than normal expansion.

(v) CWR is anchored to the bridge ties in both directions in accordance with Section 4.0 of this document.

(3) After application of hook bolts, tie anchors or other approved holding devices, these devices must be checked and retightened weekly until ties have been fully seated on top flanges of built up members.

3.0 INSTALLATION AND ADJUSTMENT OF CWR

(a) Definitions:

(1) Neutral Temperature: The rail neutral temperature (RNT) is the temperature at which a rail is neither in tension or compression (i.e., when it has zero longitudinal force).

(2) The Rail Laying Temperature (RLT): The temperature at which the rail is installed that is sufficiently high so as to provide a high RNT to prevent possible track buckling.

(i) CWR on MassDOT Rail and Transit Division owned lines shall be installed at an RLT of 105°F with an allowable construction tolerance of -10°F to +10°F or 95°F to 115°F. **The target RLT shall be at least 105°F**.

(ii) When laying and/or distressing rail, the required minimum expansion shall be determined by using a target RLT of at least 105°F (see Section 3.0 and Attachment "B").

(iii) When repairing a service failure to include broken joint bars, pulled apart joints, a broken rail, a broken weld (shop or field), the replacement of a plug rail or a rail cut in the field, the repair shall be made to ensure that the RNT after the repair is made is at or above RLT-10°F (95°F) (see Attachments A and C).

(3) Temperature Differential: The difference between the target rail laying temperature and the actual rail temperature taken at the time of installation is called the temperature differential (TD).

- (i) CWR laying and adjusting procedures have been established to take into account these temperature differences.
- (ii) If the rail temperature is below desired RNT of 105°F, the rail must be expanded to the target RLT of at least 105°F.
- (iii) The rail expansion required is marked at the quarter points in the field on the string to be expanded.
- **(iv) RNT is achieved when the correct expansion amounts have been realized at the quarter points.**
- (v) RNT is not achieved when the required rail temperature of 105°F has been reached unless the required expansion has been realized.

(b) Installation of CWR:

(1) Programmed tie renewals shall be completed in advance of rail laying.

(2) Track shall be placed in good line and surface prior to rail renewals.

(3) Track to be laid with CWR must have standard ballast section for welded rail before installation of CWR.

(4) Rails should be examined for defects and damage prior to laying in track.

(5) At the time of installation, care should be taken so that no damage to rail or fastenings will result.

(6) All ties, to include loose ties, should be tamped with a small tamper to full bearing under the rail, during rail laying operations ahead of the spiker.

(7) Any alignment deviation reduces the temperature at which a track will buckle. As an example, an alinement deviation of about 1” may reduce the buckling temperature from 10 – 15 °F°**.** In addition, an alignment deviation from a Class 5 line defect to a Class 3 line defect (1” to 1 1/8”) may reduce the buckling potential by 15 - 20°F, depending on track parameters and conditions.”

(8) **The target RLT and RNT is at least 105°F unless approved by the MassDOT Rail and Transit Division.**

(9) CWR shall be anchored or have resilient fasteners applied (“clipped”) at a rail temperature of between 95°F and 115°F, unless otherwise directed by MassDOT Rail and Transit Division. This is known as the “Desired Rail Installation Temperature Range.”

(10) An approved rail thermometer (magnetic) shall be used to measure the rail temperature of all CWR before it is anchored or clipped. The thermometer should be placed on the web of rail just above the bottom fillet, on the side of the rail that is shielded from the direct rays of the sun and left there long enough (5 minutes) to determine the temperature accurately.

(11) When the rail temperature is lower than the target RNT of 105°F an approved rail heating device or a hydraulic rail stretcher must be used for expanding the CWR to make proper adjustment.

(12) A rail puller can be used to hold the required expansion, and/or to help get the required expansion. At least 20 ties on the next string to be distressed shall be

box anchored and/or clipped to provide sufficient holding power for the rail puller to hold or pull the string being expanded.

(13) Where CWR has been anchored and/or clipped at a rail temperature below 105°F- 10°F (RLT -10°F) and not expanded to the target RNT of 105°F during the rail laying operation, the rail shall be inspected by a person qualified on §213.7(a)(b)(c)(d). A TSR shall be placed, if necessary, and then removed when the rail is expanded to a target RNT of 105°F.

(14) If the CWR is anchored and/or clipped at a rail temperature greater than 115°F (RLT +10°F), up to and including 125°F, the rail may remain in track without restriction.

(15) The following information shall be recorded on the field side web of the individual string (with permanent metal marker) as the strings are being laid:

  (i) String number

  (ii) Date installed or adjusted or distressed

  (iii) Length of string in feet

  (iv) Existing rail temperature/preferred rail neutral temperature

  (v) Total expansion required at end of string (if appropriate)

(16) The person in charge of installing the CWR shall be responsible for recording on the appropriate Form (“CWR Rail Expansion/Heat Record Report”) the amount of required expansion and the rail temperature at each CWR string is anchored. Copies of these forms should be forwarded to MassDOT Rail and Transit Division. See Appendix “E”, Form “RC”.

(17) The “CWR Rail Expansion/Heat Record Report(s)” for any CWR laid in track and or distressed shall be retained by the Railroad Operating Companies until the CWR is readjusted and/or removed from service.

(c) Adjustment/Distressing:

(1) The target RNT is always 105° or greater. When the rail temperature is lower than the target RNT of 105°F an approved rail heating device, a hydraulic rail stretcher or heating by natural means or the ambient temperature shall be used to expand the CWR at its quarter points to achieve proper adjustment.

(2) Adjusting CWR strings to increase RNT by natural means or by using the ambient temperature is allowed only if the unadjusted rail temperature falls in the Desired Rail Installation Temperature Range of RLT -10°F to +10°F or 95°F to 115°F.

(3) All rail anchors and/or resilient fasteners must be removed from strings of CWR requiring adjustment to permit the desired expansion or contraction at the quarter points of the CWR string.

(4) The anchor and/or clip removal should start at the end of the string at the last quarter point to be expanded and move back towards the ¼ point or beginning of the string to be expanded. This is especially important if the rail to be expanded is in compression.

(5) .With conventional cut spikes and plates, an approved mechanical vibratory device may be used to free the rail. Additionally, rail holding spikes shall be pulled if restraining rail movement.

(6) With elastic fasteners and rolled plates, it may be necessary to pick the rail up out of the plates and set on spikes and/or rollers about every 20th tie so as to permit the unrestrained movement of the CWR when being expanded. Again, this process should start from the last quarter point to be expanded and proceed

back towards the ¼ point or beginning of the string to be expanded. This is especially important if the rail to be expanded is in compression.

(7) The rail head must not be struck with a hammer at any time; to include expanding the rail.

(8) CWR should be heated and vibrated so that expansion is introduced from one end of each string to the other end in the direction of rail laying.

(9) All rail anchors or resilient fasteners must be re-applied immediately after the CWR string has achieved proper expansion at the quarter points based upon the target RNT of at least 105°.

(10) The number of inches each CWR string should be expanded during the rail laying operation may be determined by calculation according to the following formula:

$$A = 0.000078 \times (T_D - T_E) \times L$$

where:

A = the amount (inches) of length a CWR string must be increased or decreased to reach the target rail laying or rail neutral temperature

T_E = the existing rail temperature of the CWR before the heating process has begun

T_D = the target neutral temperature or rail laying temperature (105°F) of the CWR at the end of the heating process

L = the length of the CWR in feet

Example: How much expansion is required to adjust the length of a 1,450 ft. CWR string, anchored at a rail temperature of 50°F to the target rail laying/rail neutral temperature of 105°F? Subtract 50°F from 105°F to obtain a difference of 55°F and then multiply as follows:

$$0.000078 \times 1{,}450 \times (105 - 50) = 0.000078 \times 1{,}450 \times 55 = 6.22 \text{ inches.}$$

Say 6.25 inches

Or use "Change In Rail Length Due To Change In Rail Temperature" Table on the back of Form "RC", "Report of Rail Clipping/Anchoring" found in Attachment E.

(11) A space equal to the amount of expansion required for each string of CWR should be provided between the far end of the string being expanded and the near end of the next adjacent string.

(12) The clipping or anchoring operation shall consist of sufficient personnel so that the work will progress closely enough behind the heating and/or pulling process so that the string is held in place, and no loss of expansion occurs.

(13) Quarter points should be marked on the rail and the tie plate, so that the amount of expansion can be accurately determined. The tie plate used for marking as a reference point must be one that is either doweled or has been spiked, or screw lagged; so that it will not move as the rail expands. Particular attention must be

paid to insure that the rail does not bind on tie plates, spikes or other obstructions.

(14) Heating should commence at the beginning of the first CWR string and steadily applied while moving forward until the required expansion has been obtained at the end of the string. Uniformity of expansion is to be controlled by marking each quarter of the string and introducing expansion as follows:

¼ point - ¼ of total expansion
½ point - ½ of total expansion
¾ point - ¾ of total expansion
End of the string – 100% of total expansion

(15) If when heating, the heated CWR string does not have the required expansion at each quarter point, the heater will back over the heated portion, without applying heat, and then reheat the rail until the necessary expansion is obtained.

(16) During and subsequent to heating, resilient fasteners or anchors shall be applied to the patterns specified in Section 4.0 to prevent the rail from losing expansion. If resilient fasteners fail to hold expansion, rail anchors in the pattern of the following paragraph shall be applied.

(17) Rail anchors and/or clips may be used to control and maintain the expansion realized in a string of CWR while the rail string is being anchored and/or clipped in its entirety. A minimum of 20 consecutive ties shall be solid box anchored and/or clipped at the fully expanded end of the string , to hold the expansion while applying all other anchors and or clips as required.

(18) A rail puller can be used to hold the required expansion and/or to help get the required expansion. At least 20 ties on the next string ahead of the string being distressed shall be box anchored and/or clipped to provide sufficient holding power for the rail puller to hold or pull the string being expanded.

(19) The entire CWR string is to be anchored and/or clipped in accordance with Section 4.0 “Anchoring of CWR” before the track is returned to service and trains are permitted to operate.

(20) An approved rail thermometer (magnetic) shall be used to measure the rail temperature of all CWR before it is anchored or clipped. The thermometer should be placed on the web of rail just above the bottom fillet, on the side of the rail that is shielded from the direct rays of the sun and left there long enough (5 minutes) to determine the temperature accurately.

(21) Where CWR has been anchored and/or clipped at a rail temperature below 95°F (RLT -10°F) and not expanded to the target RNT of 105°F during the rail laying operation, the rail shall be inspected by a person qualified on §213.7(a)(b)(c)(d). A TSR shall be placed, if necessary, and the removed when the rail is expanded to at least 95°F (RLT -10°F).

(22) If the CWR is anchored and/or clipped at a temperature greater than 115°F (RLT +10°F), up to and including 125°F, the rail may remain in track without restriction.

(23) If the CWR is anchored and/or clipped at a temperature greater than 125°F, the rail may remain in track without restriction with the permission of the MassDOT Rail and Transit Division.

(24) The following information shall be recorded on the field side web of the individual string (with permanent metal marker) as the strings are being laid:

(i) String number

(ii) Date installed or adjusted or distressed

(iii) Length of string in feet

(iv) Existing rail temperature/preferred RNT

(v) Total expansion required at end of string (if appropriate)

(25) The person in charge of installing the CWR shall be responsible for recording on the appropriate Form ("CWR Rail Expansion/Heat Record Report") the rail temperature for which each CWR string is anchored. Copies of these forms should be forwarded to MassDOT Rail and Transit Division. See Appendix "E", Form "RC".

(26) The "CWR Rail Expansion/Heat Record Report(s)" for any CWR laid in track and or distressed shall be retained by the Railroad Operating Companies until the CWR is readjusted and/or **removed from service.**

4.0 ANCHORING OF CWR

(a) CWR Rail Anchoring Requirements: The following anchoring requirements apply to all CWR tracks.

(1) Existing anchor patterns may remain in place until CWR is installed.

(2) Where the anchoring function is otherwise provided, such as with a resilient fastener, rail anchors may be omitted.

(3) Anchors may not be applied where they will interfere with signal or other track appliances or where they are inaccessible for adjustment or inspection.

(4) Anchoring must effectively restrain the longitudinal rail movement.

(5) Rail must be adjusted and/or anchors must be added to rail that is moving, or where the existing anchors do not have effective holding power to restrain longitudinal movement.

(6) Anchor pattern may be varied, if possible, to avoid placing anchors against deteriorated ties.

(7) When a crosstie has four properly installed resilient fasteners, or four properly installed rail anchors, it will be considered to be fully box anchored tie.

(b) When laying or distressing welded rail, rail anchors are used to maintain the desired expansion and length of CWR strings. Crossties shall be fully box anchored in accordance with the following:

(1) Every Tie:

(i) Curves 3° and over

(ii) Through all rails of turnouts and crossovers, where practicable

(iii) For 195' in each direction from:

a. Main track turnouts and crossovers
b. Track crossings (diamonds)
c. Highway grade crossings
d. On the fixed side of expansion joints
e. On the approaches to open deck bridges
f. On both sides of all insulated joints (bonded and/or non-bonded)
g. On both sides of hot box, dragging equipment and wheel impact load detectors
h. Before bumping posts

- (2) Every Other Tie:
  - (i) Through the remainder of CWR strings where full boxing is not specified above.
- (3) Bridge Anchor Patterns:
  - (i) Ballast deck bridges should be anchored with the same pattern as the rail on each approach to the bridge.
  - (ii) Open deck bridges should be anchored according to the following table or as approved by the MassDOT Rail and Transit Division:

Length of Continuous Open Deck Portion** (ft.)	Individual Span Length (ft.)	Rail Anchor Requirements	Sliding Joint Requirements
100 ft. or less	All spans	Every 3rd or 4th tie. See §111.0(M) Bridge Timbers*	None required
Greater than 100 ft.	100 ft. or less	Every 3rd or 4th tie. See §111.0(M) Bridge Timbers*	None required
	Greater than 100 ft.	Every 3rd or 4th tie. See §111.0(M) Bridge Timbers*	As per requirements of MassDOT Rail and Transit Division

* Box anchors are to be applied only to ties that are hook bolted to the span.
**See MBTA Book of Standard Plans Drawing Nos. 1232 and 1236.

- (4) Other Anchor Patterns:
  - (a) Under pavement off the ends of grade crossing panels.
  - (b) Under grade crossing surfaces as per crossing surface manufacturer.
  - (c) In areas adjacent to the expansion side of expansion joints as authorized and approved by MassDOT Rail and Transit Division.

(c) Anchor Requirements After Making Rail Repairs in CWR and Adding Joints:

- (1) When repairs are made to stripped joint or failed bar on CWR that already exists in track, the adjustment or addition of anchors will be as prescribed below:

Condition	Action
Bolted joint in CWR experiencing a service failure (pull-apart) or failed bar(s) with gap* present (FRA §213.119(c)(3)	Weld Joint, **OR** Remediate Joint conditions **and** replace four (4) bolts (new, in-kind or stronger) **and** weld joint within 30 days, **OR** Replace broken bar(s), install 2 additional bolts (6 total) and adjust anchors (ballast permitting), **OR** Replace bars, bolts (if broken or missing) and anchor every tie for 195' in both directions (ballast permitting) **OR** Add rail and make out Form "TD" and make future repairs
* Gap exists if it cannot be closed with a drift pin.	

5.0 MAINTENANCE OF THE DESIRED RAIL NEUTRAL TEMPERATURE IN PREVIOUSLY INSTALLED CWR

(a) **Maintaining Desired Neutral Temperature Range: Broken or Defective Rail, Pull-Apart (Service Failures) And/or Tight Rail or Track Buckle**

(1) This section addresses repairs for broken or defective rail, and corrections made for tight rail, track buckle or pull-apart.

(2) Also see Attachments A, B, and C.

(3) When performing this work, care shall be taken not to add rail to the track.

(4) In general, if a length of rail is installed in CWR, it should have a length less than the rail removed and/or not exceed the length of rail removed (DO NOT ADD RAIL).

(5) Before joint bars are removed and/or a rail is cut, reference marks shall be added at tie plates and on the base of the rail. Reference marks can be used to determine how much the joint opens, or how much rail is cut out (if rail is in compression) or how much rail is added.

(6) The use of reference marks includes:

- Marking the locations where the joint is to be removed or the rail is to be cut
- Marking the rail outside the limits of the joint bars
- Measuring the distance between the reference marks and mark it on the rail
- Installing the rail and re-measure the distance between reference marks
- Recording the difference and documenting the location

(7) If rail is added for any reason, such as repairing a pull-apart, making emergency repairs, fixing a service failure or any other interim repair, measure and record the amount of rail added on Form "TD" so that adjustments can be made before reaching the rail return temperature.

(8) Existing RNT shall be estimated where the rail has pulled apart, broken, or been cut for defect removal by using the appropriate charts in Attachment A.

(9) To determine the pre-break/cut RNT, record the length of the rail end gap, rail temperature, rail base size and existing rail anchorage and use tables in Attachment “A”.

(10) The estimated pre-break/cut RNT shall be recorded on Form “TD” so that additional required repairs, if any, can be tracked and done before rail return temperatures are exceeded (see Attachment C).

(11) Work performed by Railroad Operating Companies, such as rail that has pulled apart, broken, or been cut for service failures to make repairs to CWR, shall be readjusted to a preferred RLT or RNT of 105°F +/- 10°F**. The minimum RNT is 95°F** (see Section 3.0).

(12) If rail has not been adjusted before rail return temperatures exceed the values in Attachment C, then a temporary speed restriction (TSR) of 25 MPH shall be placed. A TSR of 40 MPH may be placed if a required daily inspection is made during the heat of the day, every day, **until the adjustment and permanent repair is made.**

(13) For detailed procedures on adjusting pulled apart, broken, or cut rail, refer to Attachment C.

(b) **Adjusting or Distressing Previously Installed CWR**

(1) Rail can be distressed by heating rail and/or pulling rail that has a RNT below the target RLT of 105°F. In a curve, the CWR can be distressed or the curve can be lined out. When distressing or adjusting CWR with an RNT below the target RLT of 105°F, the following is a *general* procedure:

(2) Procedure:

(i) Determine amount of rail to be distressed on either side of a cut and/or joint (up to 800’ on either side of the joint and/or cut for a total of 1,600’ maximum).

(ii) Cut rail at the end or in center of rail to be distressed (see Attachment B).

(iii) Remove anchors or clips in both directions from either side of the cut back to the distressing limit or to a fixed object or an appliance in the track (turnout or grade crossing) or structure that prevents rail movement.

(iv) Wait until rails stop moving. The rail ends may need to be misaligned to allow for expansion and then trimmed one time (if possible) to fit.

(v) Take the rail temperature.

(vi) Compare the rail temperature to the target RLT=105°F to determine the temperature differential (TD).

(vii) If the actual rail temperature is lower than the RLT of 105°F, use the Rail Expansion Table in Attachment E (Form “RC”) to determine the rail length to be removed based on the total distance the anchors or clips that have been removed.

(viii) Expand rail required amount by using ambient temperature, rail heater and/or rail puller.

(ix) Replace the rail anchors or clips.

(x) Weld the joint or apply joint bars:

- When making an orgothermite field weld, cut out required amount of rail plus the weld width allowance as specified by the weld manufacturer. **(**Typically **1”+/-)).**
- When making an electric flash butt field weld, the amount of rail to be cut is the amount determined from the rail expansion table minus the

amount of rail consumed when making the electric flash butt weld. (Typically 3/4" to 1-1/2")**.**

(3) All other provisions of Section 3.0 apply to this process.

(c) **Procedures for Making Repairs to Buckled Track**

(1) In the event of buckled track, the following conditions exist and procedures are to be used as a guideline:

(i) Since both rails are assumed to be in compression, cut both rails with a torch.

(ii) Make these torch cuts out of the displaced track zone where there may be significant compressive stress in the rails.

(iii) Torch cuts shall be at least one rail length (39'+) beyond the end of lateral track displacement.

(iv) If possible, before cutting the rail, line the track at the point of displacement in the direction of the displacement to further reduce the compressive stresses in the rail. If the displaced area is near a joint then the joint bars should be removed after lining the track.

(v) Misalign the cut and/or uncoupled rail ends, allowing the ends to bypass.

(vi) Bring the track back into correct alignment.

(vii) Both rails for some distance on either side of the point of maximum displacement and/or the point where rails were cut or the joint bars were removed are now considered to have lost their adjustment.

(viii) These rails must be readjusted and/or distressed according to this Section.

(ix) Also, see Attachment B: "Recommended Procedures for Distressing Continuous Welded Rail (CWR) Previously Laid In Track": "Reactive or Emergency Distressing".

(x) Track buckle at a fixed object:

- In those cases where the buckle occurs at a fixed object (grade crossing, turnout, etc.) the readjustment/distressing need only take place in the direction away from the fixed object,
- However, a close inspection of the track on the other side of the fixed object is required to determine if there is any evidence of rail or track movement, rail bunching, etc. which may indicate inadequate adjustment in that area and the need for additional distressing.

(xi) If the area cannot be readjusted or repaired before running a train, appropriate remedial action shall be taken:

- A Form "TD" shall be filled out so that necessary distressing work can be accomplished before return rail temperatures are exceeded (see Attachment C).
- Alignment measurements should be taken to ensure that the track meets minimum alignment requirements for the Class of Track at which the track is to be returned to service as is shown in the FRA Track Safety Standards §213.55**.**
- Rails that have been torch cut during the corrective procedure will be either cut back and/or removed from track promptly (see Attachment B).
- On MassDOT Rail and Transit Division owned rail lines, torch cut rails shall be protected by a maximum 10 MPH (F&P) temporary slow order (TSO) until the rail is cut back and/or removed from track.

(xii) New rail adjustment and rail clipping records shall be prepared on the Rail Clipping/Anchoring Form "RC" with the new adjusted temperatures when the rail in the affected area is distressed (see Attachment E).

(xiii) The original Form "TD" that was made out at the time of the incident shall be updated to indicate that all necessary repairs, to include distressing, have been made, when the permanent repairs are made.

(xiv) The Operating Railroad shall retain Form "RC" for the record for the duration of their Operating Contract and/or until the rail is removed from service. A copy of Form "RC" shall be sent to the MassDOT Rail and Transit Division.

(d) **Installing Rail Plugs in Existing CWR Track**

(1) When it is necessary to install rail plugs in existing CWR due to replacement of defective rails, defective field or plant welds, defective joints or insulated joint failures, etc., an approved heating device or hydraulic expander must be used to **assure the amount of rail installed is equal to or less than the length of rail removed. DO NOT ADD RAIL**

(2) If the work cannot be completed and a permanent repair cannot be made before running a train, appropriate remedial action shall be taken:

(i) A Form "TD" shall be filled out to document work done so that the necessary permanent repair can be accomplished before return rail temperatures are exceeded (see Attachment C).

(3) **Where necessary to install a plug rail in CWR, use at least a 14' long plug in tangent and at least a 21' plug in curves wherever possible.**

(4) See FRA §213.119(c)(3): If it becomes necessary to apply joint bars in CWR already laid in track, because of a service failure or a failed bar with a rail gap present:

(i) Weld the joint (The end bolt hole in each rail end must not be drilled to permit field welding);

(ii) Replace broken bar(s), replace broken bolts, adjust anchors and within 30 days, weld the joint;

(iii) Replace the broken bar(s), replace the broken bolts, install one additional bolt per rail end (six hole bar needs six bolts), and adjust anchors;

(iv) Replace the broken bar(s), replace the broken bolts, and anchor every tie 195 feet in both directions from the CWR joint.

(e) **Field Welding of CWR**

(1) When field welding joints with orgothermite welds between CWR strings that have been temperature adjusted, or field welding plugs previously installed in properly adjusted CWR track:

(i) **The necessary gap for welding will not be developed by allowing the rail gap to open up to the correct welding gap.**

(ii) The following welding practices shall be used:

- Remove the joint bar. Remove with an approved rail saw 1"+/- of rail, or as specified by weld manufacturer, to provide the required welding gap. If a "Wide Gap" field weld is to be used, the gap shall be as required by the weld manufacturer. Torch cutting of rail is prohibited. **DO NOT ADD RAIL**
- To maintain the proper weld gap apply a hydraulic expander to return the rail ends to the required gap and while holding this position,

proceed to make the weld in accordance with existing procedures. Let field weld cool to 500°F before removing expander.

- Upon completion of weld reapply anchors and/or clips before removal of the hydraulic expander.

(2) All other provisions contained in §121.1(M), "Field Welding of Rail Joints," of the MW-1 will be followed when field welding is conducted.

6.0 TRACKWORK THAT DISTURBS CWR TRACK AND THE PROTECTION OF DISTURBED TRACK

6.1 General

The following trackwork repairs are considered to disturb CWR track.

6.1.1 Trackwork that Disturbs CWR

(a) Trackwork activities discussed below are repairs and/or production work that are considered to have disturbed CWR track.

(b) **Trackwork activities that disturb CWR track** shall be inspected by a qualified person as designated in FRA §213.7(a)(b)(c).

(c) Before returning the track to service, the above designated person in (b) shall take appropriate remedial action and place a TSR as given in this Section 6.0.

(d) The designated qualified person as given in (b) shall place more restrictive TSRs and additional remedial action as conditions warrant.

6.1.2 Trackwork that Does Not Disturb CWR

(a) **Trackwork activities that do not disturb CWR track** shall be inspected by a qualified person as designated in FRA §213.7(a)(b)(c).

(b) Before returning the track to service, the above designated qualified person in (a) shall take any appropriate remedial action that that person sees fit to protect the safety of train operations.

6.2 Train Definition

(a) For the purposes of this part, a train is defined as:

(1) A locomotive and at least eight loaded ballast cars (80 ton cars each) (1,000 ton +/- consist), or

(2) A commuter train with at least five cars and a locomotive (750 ton +/- consist), or

(3) Some combination of railroad equipment that is 1,000 ton consist (including locomotive), or

(4) A ballast stabilizer that is equivalent to 50 tonnage trains (1,000 tons each) or 50,000 tons, or

(5) As approved by MassDOT Rail and Transit Division.

6.3 Work Activities that Disturbs CWR Track

(a) **Installation of Plugs in CWR that Disturbs CWR Track:**

(1) If, during the installation of a plug rail in CWR, rail has been added or RNT as determined by measurement of rail gap is less than 95°F or (RNT-10°F) see Attachments A and C and the following:

(i) Install the rail anchors reversed on field side of plug rail only until necessary permanent repairs are made; or

(ii) Spray the elastic fasteners on the gage side in orange paint until necessary permanent repairs are made.

(iii) Fill out Track Disturbance Report (Form "TD"). The amount of rail added, as well as the temperature and rail gaps of the rail at the time of the break or saw cut, **shall** be reported on Form “TD”, “Record of Disturbance of Main CWR Track.”

(iv) Make temporary and/or permanent repairs as given in Attachment C using tables in Attachment A as required.

(v) The track shall be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(2) **Protective Slow Order**: See Table in Attachment C for maximum rail temperatures (°F) at which permanent repairs or readjustments shall be made and/or slow orders applied. **When these rail temperatures exceeded a TSR of no more than 25F and 25P MPH shall be placed on the track in question until repairs are made, unless inspected daily in the heat of the day, in which case the TSR can be no more than 40F and 40P MPH**

(3) Repairs shall be accomplished in accordance with Section 5.0 and Attachments C and A.

(4) Following steps (1) and (2), when permanent repairs have been made, the track will be returned to maximum authorized speed (MAS) unless additional deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

(5) If the ambient temperature is greater than 80°F (rail temperature greater than a temperature of 110°F), no work such as installing plug rails shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division.

(b) **Tie Renewal In Tangent Track and in Curves <3° that Disturbs CWR Track:**

(1) Installing more than four ties in 39' of track with four undisturbed ties between renewed ties; or

(2) Installing four or less than four ties per 39’ of track with fewer than four undisturbed ties between renewed ties.

(3) In any case no more than four ties per 39' of track (540 ties per mile) can be replaced in one pass.

(4) **When old ties are removed, and new ties and plates installed, do not lift the rail.**

(5) **When tamping ties installed, tamper should be set so that no lifting of the track occurs.**

(6) **MassDOT shall review means, methods, and equipment before ties are removed and installed.**

(7) If the ambient temperature is greater than 80°F (rail temperature greater than a temperature of 110°F), no work shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division.

(8) Ties shall not be installed at ambient temperature of less than 40°F unless approved by the MassDOT Field Representative.

(9) Fill out Track Disturbance Report (Form “TD”).

(10) The track shall be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(11) **Protective Slow Order (without stabilizer) (Ambient ≤80°F):** Not to exceed 25F and 30P MPH shall be applied for a period of 24 hours and a minimum of 12 trains over the affected track.

(12) **Protective Slow Order (with stabilizer) (Ambient ≤80°F):** Not to exceed 25F and 30P MPH shall be applied for the first train over the affected track.

(13) **Protective Slow Order (with or without stabilizer) (Ambient >80°F):** If ambient temperature >80°F and rail temperature is >110°F, a slow order of 10F and 15P shall be applied until the ambient temperature drops to 80°F. When the ambient temperature is ≤80°F, the Protective Slow Order applied is described as above in (11) or (12).

(14) Following steps (11) and/or (12), (13), track will be returned to MAS unless deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

(c) **Tie Renewal in Curves ≥3° that Disturbs CWR Track:**

(1) In addition to the protective action required when installing ties in tangent track in Paragraph (b) above, if 540 ties per mile or more are installed in curves ≥3° the following shall be done:

   (i) The curve or curves ≥3° in question shall be staked as described in Attachment E, using Form “TM,” Report of Track Movement.

   (ii) Movement of the curve(s) when ties are installed shall be recorded on Form “TM”; and,

   (iii) If a curve greater or equal to 3° moves inward and/or outward when installing ties, the curve shall be inspected by a person qualified under FRA §213.7(a)(b)(c), and appropriate remedial action taken as conditions warrant.

   (iv) If movement limits to the inside of the curve are exceeded then the RNT shall be adjusted by distressing the rail in the curve and/or lining the curve out (see Attachment B).

(2) **When old ties are removed, and new ties and plates installed, do not lift the rail.**

(3) **When tamping ties installed, tamper should be set so that no lifting of the track occurs.**

(4) **MassDOT shall review means, methods, and equipment before ties are removed and installed.**

(5) If the ambient temperature is greater than 80°F (rail temperature greater than a temperature of 110°F), no work shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division.

(6) Ties shall not be installed at ambient temperature of less than 40°F unless approved by the MassDOT Field Representative.

(7) Fill out Track Disturbance Report (Form “TD”) and Report of Track Movement (Form “TM”) as appropriate.

(8) **Protective Slow Order (with or without stabilizer) (Ambient ≤80°F)**: Same as for Tie Renewal in Tangent Track if curve movement for curves ≥3° is less than 3"as given on the table for Form “TM” (see Attachment E for table).

(9) **Protective Slow Order (without or with stabilizer) (Ambient >80°F):** If ambient temperature is >80°F and rail temperature is >110°F, a slow order of 10F and 15P MPH shall be applied until the ambient temperature drops below 80°F. When the temperature drops below 80°F, the Protective Slow Order is applied as described above in (8).

(10) **Protective Slow Order for Curve Movement (with or without stabilizer) (Ambient ≤80°F)**: If a curve ≥3° has movement ≥3" to the inside (see Form “TM,” Attachment E), a protective slow order not to exceed 25F and 30P shall be applied. In addition:

(i) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(ii) The restriction shall remain in effect until the curve is lined out back to its original position and/or both rails are readjusted to the target neutral temperature of 105°F in accordance with Section 3.0 and Attachment B

(11) **Protective Slow Order for Curve Movement (with or without stabilizer) (Ambient >80°F)**: If a curve ≥3° has movement ≥3" to the inside (see Form "TM," Attachment E), a protective slow order not to exceed 10F and 15P shall be applied. In addition:

(i) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(ii) The slow order of 10F and 15P MPH shall be applied until the ambient temperature drops below 80°F. When the temperature drops below 80°F, the protective slow order is applied as described above in (10); and

(iii) The restriction of 25F and 30P shall remain in effect until the curve is lined out back to its original position and/or both rails are readjusted to the target neutral temperature of 105°F in accordance with Section 3.0 and Attachment B.

(12) Following steps (7) through (11), track will be returned to MAS unless deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

(d) **Surfacing, Smoothing and/or Lining that Disturbs CWR Track (Tangent and Curves <3°):**

(1) **The normal balancing of throws done during high speed surfacing operations does not constitute out-of-face curve realignment.**

(2) If the ambient temperature is greater than 80°F (rail temperature greater than a temperature of 110°F), no work shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division.

(3) If the ambient temperature and/or rail temperature is less than 40°F, all work will be suspended unless it is an emergency or directed by the MassDOT Field Representative.

(4) **Protective Slow Order: T**he protection of CWR Track which has been surfaced is shown in the following table, "Protection Required for CWR Track Surfaced Based on Air and Rail Temperatures."

(5) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(6) When operating speeds change during the time a restriction (TSR) is in effect, the worked track must be re-inspected by a qualified Operating Railroad Employee each time the speed is to be raised.

(7) Whenever a dynamic stabilizer is to be used as part of a surfacing operation, it will be:

(i) Operated after each pass of the tamper; and

(ii) Both vibration units must be fully operable and the frequency of oscillation shall be in the range of 30-35 Hz, with a minimum vertical loading pressure of 870-1,000 psi and working speed shall be in the range of 1-2 MPH.

(iii) A ballast compactor may be used if approved by MassDOT Rail and Transit Division.

Protective Slow Order Required for CWR Track Surfaced Based on Air and Rail Temperatures

Air Temperature	Distance	Wood Tie Track Protection	Concrete Tie Track Protection
Applies to ALL Surfacing: STOP Work			
Ambient Does Exceed 80° or the and Rail Temperature Exceeds 110°F***	All Distances	STOP Work	STOP Work
Protections to be applied for Surfacing with NO Dynamic Stabilizer			
Ambient Does Not Exceed 80° (Rail Temp ≤110°F)	0 ft. to 19'-6" Over 19'-6"	None* 25F-30P MPH for 24 hours **and** the passage of 12 trains	None* 25F-30P MPH for 24 hours **and** the passage of 12 trains**
In an Emergency, Ambient Does Exceed 80° (Rail Temp >110°F)	All Distances Ambient >80°F All Distances Ambient ≤80°F	10F-15P MPH until ambient temperature ≤80°F 25F-30P MPH for 24 hours **and** the passage of 12 trains	10F-15P MPH until ambient temperature ≤80° 25F-30P MPH for 24 hours **and** the passage of 12 trains**
Protections to be applied for Surfacing USING a Dynamic Stabilizer			
Ambient Does Not Exceed 80° (Rail Temp ≤110°F)	All Distances WITH the use of a Dynamic Stabilizer	10F-15P MPH for the first train 25F-30P MPH for the second train, Then Normal Speed	10F-15P MPH for the first train 25F-30P MPH for the second train, Then Normal Speed
In an Emergency, Ambient Does Exceed 80° (Rail Temp >110°F)	All Distances WITH the use of a Dynamic Stabilizer	10F-15P MPH first train 25F-30P MPH for the second train, Then not more than 40F-60P MPH for the passage for 24 hours and 12 additional trains	10F-15P MPH first train 25F-30P MPH for the second train, Then not more than 40F-60P MPH for the passage for 24 hours and 12 additional trains

* If the air temperature does exceed 80°F (rail temperature exceeds 110°F) during the 24 hours following the work then a 25F-30P MPH restriction must be placed on the worked area for 24 hours and the passage of 12 trains.

** A restriction with a speed no greater than 40F-60P MPH may be applied only if a Shoulder and Crib Compactor is used immediately after surfacing. If a restriction greater than 25F and 30P MPH is applied, the first train over the affected area must be limited to 25F and 30P MPH.

***If the air temperature exceeds 80°F and the rail temperature exceeds 110°F, there is no work permitted except in an emergency or as directed by MassDOT Rail and Transit Division.

(e) **Surfacing, Smoothing and/or Lining that Disturbs CWR Curved Track: Curves >3°**:

(1) **The normal balancing of throws done during high speed surfacing operations does not constitute out-of-face curve realignment.**

(2) If the ambient temperature is greater than 80°F (rail temperature greater than a temperature of 110°F), no work shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division.

(3) If the ambient temperature and/or rail temperature is less than 40°F, all work will be suspended unless it is an emergency or directed by the MassDOT Field Representative.

(4) Curves 3° or over being surfaced and aligned shall be staked to monitor movement.

(i) To stake a curve, place reference points uniformly around the curve in the track along the gage side of the high rail, starting at the tangent to spiral point (TS). As a minimum, tag and stake the following points:

- Tangent to Spiral Point (TS)
- Spiral to Curve Point (CS)
- Full Body of Curve: at least every 200’
- Curve to Spiral Point (CS)
- Spiral to Tangent Point (TS)

(ii) The reference points shall be 200' or less apart. Each reference point around the curve shall be staked on the field side of the high rail (where possible). Stakes should be set a minimum of 15’ from the gage corner side of the high rail out of the way of ballast unloading and the ballast regulator wings.

(iii) The reference points are to be recorded on Form “TM,” “Report of Track Movement” (see Attachment E).

(iv) Measure from the reference points to the stakes on the field side of the high rail to obtain initial values of distance between reference points and stakes before any work is conducted and record on Form “TM”.

(v) The reference point to stake distances shall be re-measured immediately after the final surfacing pass by the surfacing gang. These measurements are made to determine track movement, if any, at the reference points. The measurements shall be measured and recorded on Form “TM” before track is returned to normal speed.

(vi) In addition, the track movement at the reference points should also be re-measured seven days after the work is completed.

(vii) Track movements shall be calculated and compared to the values given on Form “TM” (see Attachment E).

(5) **Protective Slow Order (any temperature):** If in surfacing and aligning a curve >3°, the limits of out-of-face curve realignment given in Attachment E, Form “TM”, are NOT EXCEEDED:

(i) If the curve is moving outward and/or inward, inspect the curve with a person qualified under FRA §213.7(a)(b)(c), and provide protection and/or TSRs as given in Section 6(d), “Surfacing, Smoothing and/or Lining that Disturbs CWR Track (Tangent and Curves <3°)”; or

(ii) If the curve is moving outward and/or inward, inspect the curve with a person qualified under FRA §213.7(a)(b)(c), and, if conditions warrant, take remedial action ad provide more restrictive protection than required in Section (6)(d), “Surfacing, Smoothing and/or Lining that Disturbs CWR Track (Tangent and Curves <°3).”

(6) **Protective Slow Order (when curve movements in Attachment E, Form “TM”, are exceeded):** If in surfacing and aligning a curve ≥3°, the limits of out-of-face curve realignment (≥3") given in Attachment E, Form “TM” are exceeded (≥3"), proceed as follows.

(i) Fill out Form “TD” Track Disturbance Report and Form “TM” Report of Track Movement.

(ii) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(iii) The curve will have been considered to have lost its neutral temperature and will have to be adjusted in accordance with Section 3.0, “Installation and Adjustment of CWR” and/or realigned out to original position as determined by staking.

(iv) **Protective Slow Order (Ambient ≤80°F):** Not to exceed 25F and 30P MPH until rail has been cut and RNT adjusted to 105°F and/or curve has been lined out to original position.

(v) **Protective Slow Order (Ambient >80°F):** Not to exceed 10F and 15P until:

- The ambient temperature drops below 80°F. When the temperature drops below 80°F, the protective slow order is applied as described above in (iv) above; and.
- The restriction of 25F and 30P shall remain in effect until the curve is lined out back to its original position and/or both rails are readjusted to the target neutral temperature of 105°F in accordance with Section 3.0 and Attachment B

(7) Following steps (4) through (6), the track will be returned to MAS unless deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

(f) **Cut and Throw of Track that Disturbs CWR Track:**

(1) If the ambient temperature is greater than 80°F (rail temperature greater than a temperature of 110°F), no work shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division.

(2) When existing CWR track is cut and thrown, it will be considered to have lost its neutral temperature and will have to be adjusted in accordance with Section 3(b). **DO NOT ADD RAIL.**

(3) Fill out Track Disturbance Report (Form “TD”).

(4) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(5) **Protective Slow Order (Ambient ≤80°F):** Not to exceed 25F and 30P MPH shall be applied until RNT is readjusted to 105°F.

(6) **Protective Slow order (Ambient >80°F):** Not to exceed 10F and 15P MPH until RNT is readjusted to 105°F.

(7) The area of cut and throw will have been considered to have lost its neutral temperature and the RNT shall be adjusted in accordance with Section 3.0, “Installation and Adjustment of CWR.”

(8) RNT adjustments shall be made before the ambient and rail temperatures reach those given in (1).

(9) Following steps (3) through (8), the track will be returned to MAS unless deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

(g) **Switch or Track Panel Installation that Disturbs CWR Track:** When performing panel installation, the following requirements apply:

(1) Fill out Track Disturbance Report (Form “TD”).

(2) Switch and track panel installation shall only be performed at ambient temperatures greater than 30°F unless it is an emergency or as directed by MassDOT Rail and Transit Division; and,

(3) If the ambient temperature is greater than 80°F (rail temperature greater than a temperature of 110°F), no work shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division.

(4) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(5) The area of switch or track panel installation will have been considered to have lost its RNT if:

(i) Rail has been added when the switch and track panel has been installed.

(ii) This can be determined by placing match mark on the rail before the track is cut to install the switch and/or track panel and by measuring the rail gap.

(6) If RNT has been lost, the rail shall be adjusted to a target RNT of 105°F in accordance with Section 3.0, “Installation and Adjustment of CWR.”

(7) If rail has been added, a protective slow order shall be placed until the adjacent CWR and RNT is adjusted. These RNT adjustments shall be made before the ambient and rail return temperatures are exceeded as given in Attachment C. These temperatures are related to the rail temperature at which the rail was cut to install the track or switch panel.

(8) **Protective Slow Order (Ambient ≤80°F) (until rail neutral temperature adjustment):** Not to exceed 25F and 30P shall be applied until the RNT adjustment work is accomplished.

(9) Protective Slow Order (Ambient >80°F) (until rail neutral adjustment): Not to exceed 10F and 15P MPH shall be applied until the RNT adjustment work is accomplished.

(10) In addition, the track panel has lost all its lateral stability and the CWR is considered disturbed until the ballast section is restored and recompacted/stabilized by machine action and/or by train traffic.

(11) **Protective Slow Order (at any ambient Temperature) (with correct RNT) (to consolidate ballast without stabilizer):** Place a protective slow order not to exceed 25F and 30P MPH will be applied after surfacing, for a period of 24 hours ***and*** a minimum of 12 trains over the affected track.

(12) **Protective Slow Order (at any ambient Temperature) (with correct RNT) (to consolidate ballast with stabilizer):** Not to exceed 25F and 30P MPH shall be placed for a period of 24 hours and a minimum of three trains over the affected track if a stabilizer has been used.

(13) Following steps (4) through (12), the track will be returned to MAS unless deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

(h) **Undercutting that disturbs CWR track:** When performing this work, the following requirements apply:

(1) Fill out Track Disturbance Report (Form “TD”).

(2) Undercutting shall not be done at an ambient temperature below 30°F and above 80°F (rail temperature greater than a temperature of 110°F) except in an emergency and as approved by MassDOT Rail and Transit Division.

(3) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(4) When undercutting track, the neutral temperature shall be considered lost and the rail will have to be adjusted to a target RNT of 105°F in accordance with Section 3.0, “Installation and Adjustment of CWR.”

(5) These RNT adjustments shall be made before the ambient and rail return temperatures are reached as given in Attachment C. These temperatures are related to the rail temperature at which the rail was undercut and the existing RNT was substantially altered.

(6) **Protective Slow Order (Ambient ≤80°F) (until rail neutral temperature adjustment):** Not to exceed 25F and 30P shall be applied until the RNT adjustment work is accomplished.

(7) **Protective Slow Order (Ambient >80°F) (until rail neutral adjustment):** Not to exceed 10F and 15P MPH shall be applied until the RNT adjustment work is accomplished.

(8) **Protective Slow Order (at any ambient Temperature) (with correct RNT) (to consolidate ballast without stabilizer):** Place a protective slow order not to exceed 25F and 30P MPH will be applied after surfacing, for a period of 24 hours ***and*** a minimum of 12 trains over the affected track.

(9) **Protective Slow Order (at any ambient Temperature) (with correct RNT) (to consolidate ballast with stabilizer):** Not to exceed 25F and 30P MPH shall be placed for a period of 24 hours and a minimum of three trains over the affected track if a stabilizer has been used.

(10) Following steps (3) through (9), the track will be returned to MAS unless deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

(i) **Out-of-Face Shoulder Ballast Cleaning that Disturbs CWR Track:**

(1) Fill out Track Disturbance Report (Form “TD”).

(2) Out-of-Face shoulder ballast cleaning shall not be done at an ambient temperature below 30°F and above 80°F (rail temperature greater than a temperature of 110°F) except in an emergency and as approved by MassDOT Rail and Transit Division.

(3) After shoulder ballast cleaning is performed, there shall be a full restoration of the standard ballast section to include cribs and shoulders.

(4) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(5) **Protective Slow Order (with compactor and/or stabilizer) (Ambient Temperature ≤80°F):** The track may be put back at MAS provided that:

(i) The first train shall operate after out-of-face shoulder ballast cleaning at no more than 25F and 30P MPH.

(ii) The Operating Railroad person qualified under FRA §213.7 shall re-inspect the track and if no deficiencies are found; and

(iii) The track has a fully restored standard ballast section that has been treated with:

- A standard ballast compactor and/or;

- A dynamic stabilizer.

(iv) The track shall be returned to MAS.

(6) **Protective Slow Order (without compactor and/or stabilizer) (Ambient Temperature ≤80°F):** If ballast compaction is not performed with a standard ballast compactor and/or a dynamic stabilizer:

(i) The track shall have a protective slow order of no more than 25F and 30P MPH for 24 hours. for a period of 24 hours ***and*** a minimum of 12 trains over the affected track.

(ii) The Operating Railroad person qualified under FRA §213.7 shall re-inspect the track and if no deficiencies are found;

(iii) The track speed shall be returned to MAS.

(7) **Protective Slow Order (with compactor and/or stabilizer) (Ambient >80°F):** In an emergency, if the ambient temperature exceeds 80°F (rail temperature >110°F), out-of-face shoulder ballast cleaning shall continue only if a shoulder compactor and/or dynamic stabilizer is used. A protective slow order shall be placed as follows:

(i) Wood or concrete tie track: not to exceed 25F and 30P MPH during the period the air temperature exceeds 80°F and/or until 24 hours elapses then re-inspect and return to MAS, if appropriate.

(j) **CWR Installation that is Unacceptable:**

(1) Fill out Track Disturbance Report (Form “TD”)

(2) CWR not installed in compliance with Section 3.0.

(3) A protective slow order not to exceed 25F and 30P MPH until the CWR is installed and adjusted to the target neutral temperature of 105°F as per Section 3.0.

(k) **Anchor or Clip Removal that Disturbs CWR Track:**

(1) When more than eight ties per 39’ of track have anchors or clips removed and/or missing; or,

(2) The required standard anchor pattern as in Section 4.0 does not exist, CWR track is disturbed; and

(3) Fill out Track Disturbance Report (Form “TD”)

(4) **Protective Slow Order (Ambient >80°F):** If anchor/clip replacement is not accomplished before the ambient temperature exceeds 80°F (rail temperature >110°F), a slow order not to exceed 25F and 30P MPH and shall be in effect until the proper number of anchors or clips are applied and/or re-applied in the pattern as described in Section 4.0.

(5) Install all missing anchors and/or clips.

(6) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(7) Following steps (3) through ((6), the track will be returned to MAS unless deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

(l) **Cribbing that Disturbs CWR Track:**

(1) Cribbing more than three ties in a row in 39'; or

(2) Cribbing four or more ties with less than four undisturbed ties between ties cribbed.

(3) In all cases no more than three successive ties or more than four ties per 39’ of track can be cribbed in one pass.

(4) Track with the cribs reduced in the rail seat area for the mechanical installation of rail anchors on properly adjusted CWR does not require a slow order for improper ballast section, if this is the only ballast section deficiency and the track has not had lateral resistance reduced.

(5) If the ambient temperature is greater than 80°F (rail temperature greater than a neutral temperature of 110°F), no work shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division.

(6) Fill out Form “TD” Track Disturbance Report.

(7) The track must be inspected by a person qualified under FRA §213.7 to ensure that the track is safe for the passage of the first train.

(8) Wood or concrete tie track will be returned to service:

  (i) When all the cribs are filled with new ballast and dressed and mechanically tamped.

(9) **Protective Slow Order (at any ambient temperature):** Not to exceed 25F and 30P MPH for a period of 24 hours and the passage of 12 trains over the affected track, re-inspect and return track to MAS, as appropriate.

(10) Following steps (6) through (9), track will be returned to MAS unless deficiencies or defects are observed and then appropriate remedial action shall be taken in accordance with FRA Part 213.

6.4 Suspension of Work Due to Heat Where Ambient Temperature >80°F or Rail Temperature >110°F

(a) The following work which can reduce the stability of CWR at higher temperatures will be suspended (except under a continuous track outage) or unless there is an emergency, when air temperatures are expected to be above 80ºF (rail temperature greater than a rail temperature of 110°F):

  (1) Tie Renewal

  (2) Tie Renewal in Curves

  (3) Surfacing, Smoothing and/or Lining

  (4) Out-of-face Curve Re-aligning

  (5) Cut and Throw of Track

  (6) Installation of Track or Switch Panels

  (7) Undercutting

  (8) Out-of-Face Shoulder Ballast Cleaning

  (9) Cribbing

6.5 Protection of Work Areas for Latent Heat Effects

(a) **This requirement applies for work that has been done that disturbs CWR track until seven days of traffic has been accumulated over the work area, or the period of high heat ends.**

(b) The speed restriction shall be placed by a person qualified on FRA §213.7(a)(b)(c), if appropriate, on a case-by-case basis if the air temperature is at 80ºF or above (rail temperature >110°F).

(c) Each Operating Railroad qualified employee in a work block is responsible for the protection and inspection requirements of this Section, as they relate to the work conducted under the railroad’s control.

(d) In the case where a Foreman is working in an out-of-service block of track under the control of another Foreman, but at a separate location from the Foreman providing protection:

  (1) This Foreman will inspect and report the findings, if any, to the Foreman in charge of the track before reporting clear of the track.

  (2) This report must include any required speed restrictions and any other information that would affect the safe movement of trains.

7.0 SPECIAL INSPECTIONS OF CWR TRACK

(a) **Special Inspection in Hot Weather**

  (1) When the air temperature is >95ºF or the rail temperature is >125°F, all main tracks with CWR shall be inspected by qualified Operating Railroad personnel qualified on Track Safety Standards, Part 213, §213.7(a)(b)(c) and in accordance with currently established inspection procedures, outlined in this Appendix.

  (2) During periods of extreme heat, when air temperatures exceed 95ºF or the rail temperature is >125°F, the Operating Railroad qualified employee should make Special Inspections and place appropriate speed restrictions (TSR) and take remedial action, as required.

  (3) Determination of Temperature: The rail temperature is the preferred temperature and is taken with an approved rail thermometer. The air temperature is as reported by the National Weather Service.

  (4) Operating Railroad personnel shall make out a "Special Track Inspection Report" (see Appendix F, "Forms") for this inspection and retain a copy for the duration of the Operating Contract that can be reviewed by the MassDOT Rail and Transit Division.

  (5) During this inspection, the track inspector must be particularly alert for wavy track, longitudinal rail movement, kinked joints in compression and evidence of lateral track movement. The track inspector must also be aware that the following conditions increase the possibility of buckling:

    (i) Recently worked track

    (ii) Fouled ballast and mud spots

    (iii) Gaps in the ballast at the ends of the ties indicating tie movement

    (iv) Existing deformations in line and surface

    (v) Rail canting and/or lifting out of the tie plates

    (vi) Shiny marks on the base of the rail indicating that the rail is sliding through the anchors and/or clips

    (vii) Kinky or wavy rail

    (viii) Bottom of sag curves

    (ix) In areas of heavy braking and acceleration

    (x) Higher degree curves

    (xi) Fixed facilities (i.e., turnouts, road crossings, bridges, etc.)

    (xii) Sub-standard ballast section

    (xiii) Sub-standard anchor/clip pattern

    (xiv) Sub-standard tie conditions

  (6) If track is identified as having any conditions which indicate the possibility of buckling, remedial action must be taken immediately by Operating Railroad personnel qualified in FRA §213.7(a)(b)(c).

(b) **Special Inspection in Cold Weather**

- (1) When the air temperature or the rail temperature is ≤10°F, all main CWR and jointed tracks will be inspected by qualified Operating Railroad personnel in accordance with currently established inspection procedures, outlined in this Appendix.
- (2) Determination of Temperature: The rail temperature is the preferred temperature and is taken with an approved rail thermometer. The air temperature is as reported by the National Weather Service.
- (3) Operating Railroad personnel shall make out a "Special Track Inspection Report" (see Appendix F, "Forms") for this inspection and retain a copy for the duration of the Operating Contract that can be reviewed by the MassDOT Rail and Transit Division.
- (4) Inspectors will inspect, at a minimum, for:
  - (i) Broken rails
  - (ii) Canted rails out of the plates on curves
  - (iii) Bent bolts
  - (iv) Pull-aparts
  - (v) Broken welds
  - (vi) Wide gap between rail ends
  - (vii) Cracked or broken joint bars (conventional and insulated)
  - (viii) Curve movement to the inside

(c) **Semi-Annual Inspections**

- (1) A Spring inspection, between April 1 and May 30 (before air temperature of 80°F or a rail temperature of 110°F), and a Fall inspection between October 15 and November 15, shall be made by walking or by a hy-rail on all CWR main track. This inspection shall made using the "Report of Semi-Annual Inspection of CWR Track" found in Attachment E. The Inspection shall be made by a Manager of the Operating Railroad qualified under FRA §213.7(a)(b)(c).
- (2) The inspection will concentrate on compliance with standards in the following areas:
  - (i) Anchor pattern
  - (ii) Anchor position
  - (iii) Resilient fasteners
  - (iv) Tie condition
  - (v) Ballast condition
  - (vi) Ballast section
  - (vii) Joint condition
  - (viii) Evidence of longitudinal rail movement, particularly at fixed locations, such as turnouts and grade crossings and open deck bridges.
  - (ix) Drainage condition
  - (x) Overall roadbed stability
  - (xi) Curve movement
  - (xii) Alinement deviations

(3) The Operating Railroad Manager will, within 30 days from the completion of the inspection, submit inspection information to the MassDOT Rail and Transit Division. Some of the information to be included is:

  (i) A report of the special inspection that identifies track inspected by number and milepost limits;

  (ii) The name of the individuals inspecting;

  (iii) Date inspected;

  (iv) Any exceptions found; and

  (v) Protective and corrective action identified.

(d) **Protection of CWR Track with Deficiencies**

(1) When making Special Inspections (Hot and Cold Weather), Bi-Annual Inspections (Spring and Fall) and/or regular scheduled inspections in CWR track, if any of the above conditions described above in this paragraph are found to exist:

  (i) Remedial action shall be taken, if required, as per FRA §213.5 by an individual qualified as per FRA §213.7(a)(b)(c).

(2) It is extremely important that noted deficiencies be corrected before the air temperature is expected to be above 80°F or the rail temperature expected to be above 110°F.

(3) If deficiencies are not corrected before the air temperature is expected to be above 80°F or the rail temperature above 110°F, appropriate remedial action shall be taken as per FRA§213.5, by an individual qualified as per FRA §215.7(a)(b)(c), if warranted.

(4) Determination of Temperature: The rail temperature is the preferred temperature and is taken with an approved rail thermometer. The air temperature is as reported by the National Weather Service.

8.0 JOINTS IN CWR TRACK

8.1 New Installations of CWR

(a) Joints in CWR track when installing CWR:

(1) When a joint or joints are installed in CWR during installation of CWR, one of the following actions per FRA 213.119(c)(2) shall be undertaken within 60 days:

  (i) Weld the joint;

  (ii) Install additional bolts in the joint bar so that all holes (6 holes) in the bar contain a bolt; or

  (iii) Fully box anchor every tie for 195' in both directions from the joint.

8.2 Service Failures in Existing Previously Installed CWR

(a) Bolted joints in existing CWR that experience a service failure:

(1) In the case of a bolted joint in CWR experiencing service failure or a failed bar with a rail gap present, within 30 days either of the following actions per FRA 213.119(c)(3) shall be taken:

  (i) Weld the joint;

  (ii) Replace the broken bar(s), replace the broken bolts, adjust the anchors and, within 30 days, weld the joint;

  (iii) Replace the broken bar(s), replace the broken bolts, install one additional bolt per rail end, and adjust anchors.

  (iv) Replace the broken bar(s), replace the broken bolts, and anchor every tie 195' in both directions from the CWR joint; or

(v) Replace the broken bar(s), replace the broken bolts, add rail with provisions for later adjustment pursuant to FRA §213.119(d)(2) and reapply anchors.

8.3 Service Failure of Joint Bars and/or Track Bolts in a CWR Joint

(a) Minimum remedial action required:

(1) In the event of:

(i) Cracked or broken joint bar or bars, and

(ii) Bent and/or broken joint bolt or bolts,

(iii) Take the appropriate minimum remedial action given below and as shown in Attachment D, “Joint Defect Guidelines/Maximum Allowable Temporary Speed Restrictions (TSRs)”.

(b) Number of bolts in rail ends required:

(1) In CWR track each rail end shall be bolted with at least two bolts at each bolted joint used to connect CWR strings, or CWR strings to conventional rail.

(2) Where either of the following conditions are found to exist, the track must be protected by the appropriate remedial action until the condition is corrected:

(i) Less than two bolts, but at least one bolt in a rail end: fix or place a TSR of no more than 10F/15P MPH until repaired.

(ii) One rail end unbolted (see Attachment D).

(3) Each joint bar must be held in position by track bolts or fasteners, and tightened sufficiently to provide support for abutting rail ends.

(4) When no-slip, or joint-to-joint rail contact exists by design; these locations are considered to be CWR track, and must meet all the requirements for CWR in this Appendix.

(c) Cracked or broken joint bars (see Attachment D):

(1) If a joint bar is cracked, broken or because of wear allows vertical movement of either rail when all bolts are tight, it shall be replaced.

(2) If a joint bar is cracked between the middle two bolt holes it shall be replaced.

(3) If between the middle two bolt holes, both joint bars are found to be cracked or one joint bar is found to be broken entirely through, trains may not be operated and the track taken out of service (see Attachment D) until the joint bars are replaced.

(4) If both joint bars are found to be broken entirely through between the middle two bolt holes, trains may not be operated and the track taken out of service (see Attachment D) until the joint bars are replaced.

(d) Opening (gap) of joints in CWR (see Attachment D):

(1) Bolted Rail Ends (Both Ends): The gap between rail ends shall be less than 1-1/2". If a joint is found to be open 1-1/2", a maximum 25F and 30P MPH temporary speed restriction shall be applied if there are two effective bolts in each rail end.

(2) Bolted Rail Ends (One End): If the gap between the rail ends is 1-1/2" but less than 2", a person designated under FRA §213.7(a)(b)(c)(d), shall visually supervise each train move. Repair the joint within 24 hours.

(3) Bolted Rail Ends (One End): If the gap between the rail ends is greater than 2" but 4" or less, a person designated under FRA §213.7(a)(b)(c)(d) shall visually supervise each train move. Repair the joint within 24 hours.

(4) Bolted Rail Ends (One End): If the gap between the rail ends is 4" or greater, the track shall be taken out of service until the joint is repaired.

8.4 Inspection of Joints In CWR Track

(a) Joints in CWR track must be inspected on foot according to §213.119. Rail joints in CWR track within turnouts, track crossings, expansion joints or lift rail assemblies need not be inspected during the walking inspection as they shall be inspected monthly in accordance with §213.235.

(b) The limits of the turnout for the purpose of this part are defined as a point 50 feet in advance of the points to the last long timber, or the heel of the frog if weave timbers are found at the heel.

(c) The limits of a track crossing, expansion joint, or lift rail assembly will be any joint within 20 ft. of the device.

(d) This inspection results shall be recorded on the Operating Railroad's Turnout Inspection Form.

(e) During walking inspections of joints in CWR particular attention must be paid to the following conditions of the joint and the track surrounding the joint:

  (1) Cracks in the joint bar

  (2) Evidence of movement of the bars in relation to the rail ends in the fishing areas ("loose" joints)

  (3) Loose, bent or missing joint bolts

  (4) Rail end batter

  (5) Rail end mismatch

  (6) Track surface, particularly hanging ties at the joint

  (7) Evidence of excessive longitudinal movement of rail noted by the displacement of rail anchors, or "polished" areas at the ends of the bars or at rail anchors or clips

(f) All requirements per FRA Part 213 applying to Gage, Track Surface, Crossties, Defective Rails, Rail End Mismatch, Rail Joints, Rail End Batter, Tie Plates, and Rail Fasteners still apply. If there is a combination of conditions that substantially increases the chance of a broken joint bar an appropriate speed restriction should be applied.

8.4.1 Embedded Joints

(a) Permanently Embedded Joints:

  (1) Where embedded joints exist, it is not necessary to disassemble or remove the track structure (e.g., remove pavement or crossing pads), to conduct an inspection of CWR joints unless there a deficiency or defect is suspected. Every effort must be made to inspect the visible portions of the joint bar and/or joint in embedded track construction.

  (2) In new construction there shall be no embedded joints without the permission of the MassDOT Rail and Transit Division.

(b) Temporarily Embedded Joints:

  (1) Joints may be embedded in a temporary crossing.

  (2) Every effort should be made to keep the joint bar visible for inspection through the use of flangeway protection such as timbers, etc.

8.4.2 Joint Inspection in CWR

(a) Each joint in CWR shall be identified by using:

- (1) Route;
- (2) Track designation;
- (3) Milepost;
- (4) Joint type;
- (5) Rail designation; or
- (6) Other information so that the joint can be identified in the field.

(b) The Operating Railroad Company will maintain a computer-based inventory of each joint and furnish a copy to MassDOT Rail and Transit Division annually. The annual report shall also include the past five years of data as developed by the Operating Railroad Company.

(c) Each time a joint is removed from track by welding and/or is removed by the installation of rail that eliminates the joint, a Report of Joint Elimination by Field Welding shall be filled out (see Attachment E). The disposition of joints in track removed shall be noted on the next report when inspecting joints in CWR. By doing this, joints in CWR are reported from the time they are introduced until the time they are removed from track.

(d) The joint inventory will not contain those joints considered part of a turnout, track crossing, expansion joint, or lift rail assembly as the inspection of these joints is contained on the Monthly Switch Inspection Form as per §213.235.

8.4.3 Record of Inspections

(a) Each walking inspection of a joint in CWR track shall be recorded on the Operating Railroad Company's Special Track Inspection Report.

(b) The information on the Form shall include at a minimum, the Joint Identification Number, the route, the track, the milepost, the rail type, and any defects that require a remedial action and/or a permanent repair.

9.0 TRAINING

(a) To be considered qualified under §213.7 to supervise or conduct the installation, maintenance, adjustment and inspection of CWR track; individuals will receive instruction in, and be tested on, the **Operating Railroad's Approved CWR Plan.**

(b) All Operating Railroad MW employees responsible for the inspection, installation, adjustment, or maintenance of CWR track must successfully complete training on the Operating Railroad's Approved CWR Plan every calendar year.

(c) In addition, Operating Railroad MW employees shall be provided with a copy of these procedures which they shall make available at any CWR job site, if requested.

(d) The Operating Railroad shall maintain a list of those employees qualified to supervise restorations and inspect track in CWR territory. The Operating Railroad shall make this list available upon request.

(e) Annual CWR training programs will address the following:

- (i) The Operating Railroad's Approved CWR Plan and the application of written CWR procedures issued by the Operating Railroad.
- (ii) The qualification and designation of the Operating Railroad's MW personnel to:
  - Know and understand the requirements of the Operating Railroad's CWR Plan; and
  - Have the ability to detect deviations from the Operating Railroad's CWR Plan; and

- Can prescribe appropriate remedial action when deviations are discovered from the Operating Railroad's CWR Plan; and
- Have written authorization from the Operating Railroad to prescribe remedial action and/or make necessary repairs.

(iii) Subjects to be discussed during the annual training on the Operating Railroad's CWR Plan include, but are not limited to, the following:

- Installation and Adjustment of CWR
- Anchoring of CWR
- Maintenance of Desired Rail Neutral Temperature in Previously Installed CWR
- Trackwork That Disturbs CWR Track and Protection of Disturbed Track
- Special Inspections of CWR Track
- Joint Inspections in CWR Track
- Training
- Record Keeping

10.0 REPORTING REQUIREMENTS FOR CWR TRACK

(a) Report of Disturbance of CWR Track (Form "TD") (Attachment E)

(1) When any maintenance operations are considered to have disturbed CWR track as per Section 6.0, or if any rail is cut in CWR track or a service failure occurs in CWR track, a "Report of Track Disturbance", Form "TD", will be filled out by the Operating Railroad.

(i) Part A of this Form shall be completed for any work listed in Section 6.0 above which causes the CWR track to be considered disturbed.

(ii) Part B shall be completed whenever there is a Service Failure or CWR in main track is cut or broken for any reason.

(iii) The "Report of Track Disturbance Form" with instructions is found in Attachment E.

(iv) When this report is completed, a copy shall be retained on file for the duration of the Operating Contract for review by the MassDOT Rail and Transit Division.

(b) Report of Track Movement (Form "TM") (Attachment E)

(1) During out-of-face surfacing operations and/or the out-of-face installation of ties, the neutral temperature can be adversely affected on curved track. The track may be line in and/or the track may pull in due to reduced longitudinal and lateral resistance of the track structure.

(i) For curves of 3° and greater, a "Report of Track Movement, Form "TM" shall be made out when the curve is surfaced out-of-face or when more than 540 ties per mile are installed.

(ii) This report shall be required in addition to the Report of Track Disturbance of CWR Track (Form "TD").

(iii) The curve shall be stationed at key geometric locations. Reference stakes shall be added to the field side of the high side of the curve so that curve movement during and/or after maintenance work is performed can be obtained.

(iv) This report shall be completed by the Contractor or Operating Railroad Company on whose territory the work is being performed. The "Report of Track Movement" Form with instructions is found in Attachment E.

(v) When this report is completed, a copy shall be retained on file for the duration of the Operating Contract for review by the Operating Railroad Company.

(c) **Report of Joint Elimination by Field Welding (Form "JE") (Attachment E)**

(1) Any time a field weld is made to eliminate a joint, either by the thermite or flash butt method, Form "JE" must be completed by the Contractor/Operating Railroad Company in charge of the work.

(i) The "Report of Joint Elimination by Field Welding" is found in Attachment E.

(ii) This report shall be required in addition to the Report of Track Disturbance of CWR Track (Form "TD").

(iii) This report shall be completed by the Contractor/Operating Railroad Company on whose territory the work is being performed.

(iv) When this report is completed, a copy shall be retained on file for the duration of the Operating Contract for review by the Mass DOT Rail and Transit Division.

(d) **Report of Rail Clipping/Anchoring (Form "RC") (Attachment E)**

(1) Any time CWR is adjusted according to the requirements of Section 3.0 of this document the Form, "Record of Rail Clipping/Anchoring," Form "RC," must be completed by the Contractor/Operating Railroad Company in charge of the work.

(i) The "Record of Rail Clipping/Anchoring", Form "RC" with instructions, is found in Attachment E.

(ii) When this report is completed, a copy shall be retained on file for the duration of the Operating Contract for review by the Operating Railroad Company.

(e) **Report of Semi-Annual (Spring/Fall) Inspection of CWR Track (Form "CWR") (Attachment E)**

(1) Any time CWR is inspected annually either in the Spring and/or the Fall according to the requirements of Section 7.0 of this document the Form, **"**Report of Semi-Annual (Spring/Fall) Inspection of CWR Track," Form "CWR" must be completed by the Contractor/Operating Railroad Company in charge of the work.

(i) The **"**Report of Semi-Annual (Spring/Fall) Inspection of CWR Track," Form "CWR", is found in Attachment E.

(ii) When this report is completed, a copy shall be retained on file for the duration of the Operating Contract for review by the Operating Railroad Company.

(f) **Special Inspections – Earthquakes**

(1) When an earthquake occurs, each quake's magnitude – or inherent strength is measured and reported by the National Earthquake Information Service operated by the U.S. Geological Survey in Golden, Colorado.

(2) The Richter scale gages the energy released by an earthquake, as measured by the ground motion recorded on a seismograph. The magnitude of an earthquake is the same no matter where one is located. Its intensity – or the degree to which it is felt in a specific location – varies depending on one's distance from the earthquake's epicenter, or center of energy.

(3) When an earthquake is reported, the Operating Railroad notifies Maintenance-of-Way to begin a Special Track Inspection.

(4) Use the criteria in the Table below to determine whether a special inspection is warranted.

Magnitude (Richter Scale)	**Initiate Special Track Inspection**	**Criteria/Action**
Unknown	Yes	Reports of ground shaking in a geographic area. Trains stop within 50-mile radius of reported shaking until inspection is complete.
0.1 to 4.9	No	No action required.
5.0 to 5.4	Yes	When track is within a 30-mile radius of the epicenter, trains in affected areas slow to restricted speed until inspection is complete.
5.5 to 5.9	Yes	When track is within a 50-mile radius of the epicenter, trains stop in the affected area until inspection is complete.
6.0 to 6.9	Yes	When track is within a 100-mile radius of the epicenter, trains stop in the affected area until inspection is complete.
7.0 and above	Yes	When track is within a 150-mile radius of the epicenter, trains stop in the affected area until inspection is complete.

(5) Special inspections shall identify hazards and identify necessary remedial action(s) to protect the safety of trains operating in the affected areas.

(6) When conducting a special inspection, check the following:

- Materials fouling the track, such as trees, pole lines, wires, etc.
- Alignment, cross level, and profile of the track.
- Bridge piers, abutments, and bulkheads for signs of structural damage.
- Substructure and superstructure for damage from large objects falling into structures.
- Piers, bents, and bridge members for missing components.
- Signal outages and malfunctions.
- Landslides in cuts and slope failures in fills.

(7) Fill out “Special Track Inspection Report” and retain for duration of Operating Contract.

11.0 RECORD KEEPING

(a) Report of CWR Installations

(1) Rail temperature, neutral temperature, location, and date of CWR installations must be recorded in system logs or data management system and must be retained by the Operating Railroad for the duration of the Contract with the MassDOT Rail and Transit Division.

(b) Report of Maintenance Work in CWR

(1) Because track maintenance can substantially impact CWR stability and safety, the following records of work done must be recorded on Form “TD” and must be kept by the Operating Railroad for the duration of the Contract with the MassDOT Rail and Transit Division.

- (i) Rail that is added for any reason.
- (ii) Repair of broken or defective rails, pull-aparts and welding of rail joints, and changing glued plug insulated joints.
- (iii) A record of pre-break/cut RNT when rail has pulled apart, broken, or been cut for defect removal (see Attachment C).
- (iv) A record of the readjusted RNT after a rail has pulled apart, broken, or been cut for defect removal (see Attachment C).
- (v) Where a curve has been staked and the curve has chorded as a result of surfacing and lining track (Form “TM”, Attachment E).
- (vi) CWR installation or maintenance work that does not conform to Appendix “A” procedures.

(2) Any time work is performed in CWR territory by a Contractor and/or the Operating Railroad, an Operating Railroad qualified person under FRA §213.7(c) shall make out a Track Disturbance Form (Form “TD”, Attachment E).

(3) The Contractor and/or the Operating Railroad shall review the Form “TD” to ensure necessary corrections and adjustments and permanent repairs are made so as to maintain the overall stability of CWR track.

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ATTACHMENT A

DETERMINATION OF ESTIMATE OF PRE-BREAK / PRE-CUT NEUTRAL TEMPERATURE FOR A SERVICE FAILURE IN CWR

(a) General

  (1) In line with Section 5.0’s requirements, the RNT will be estimated and recorded on Form “TD” where a weld has broken or a rail has pulled apart, broken or been cut for defect removal (service failure).

  (2) This attachment addresses how to calculate the rail’s neutral temperature before the break or before the cut for defect removal.

  (3) Attachment A provides an estimate of neutral temperature based on the measured field gap size, rail size and fastener type.

  (4) The rail size is given in terms of a 6" base rail (i.e., for rail sizes above 115# rails) and for 5-1/2" rail (i.e., for 115# and below).

  (5) The fastener types are given as EOTA (every other tie anchored) and ETA (every tie anchored).

  (6) Concrete tie elastic fasteners, CTEF, and elastic fasteners on wood ties (such as Pandrol type) fall into the ETA category.

  (7) The pre-break/pre-cut estimated RNT must be recorded on Form “TD” when making field repairs and kept in a data base by the Operating Railroad for managing subsequent readjustments.

(b) Use of the following tables: **NOTE**

  (1) For wood tie tracks 200' from a fixed point (switches, turnouts, crossings, bridges, tunnels, etc.) they **DO NOT apply**. For such the data entry on the Form “TD” should be: ***NA**.

  (2) For wood tie tracks between 200' - 400' of a fixed point apply EOTA tables, but data entry Form “TD” should be: ***AP** (for approximate)

  (3) Tables for concrete ties and for wood ties with elastic fasteners, apply 200' beyond a fixed point, but **DO NOT apply within 200'**. For the latter, data entry on Form “TD” should be: ***NA**.

  (4) For wood or concrete tie tracks where breaks/cuts on the same rail are clustered in close proximity (i.e., within 800' of each other). The data entry on Form “TD” should be: ***NA**.

  (5) For iced rail/frozen ballast, tables **DO NOT apply**. For such, data entry on Form “TD” should indicate: ***FB**.

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Table 1a. 6" Base Rail
Wood Tie Track / Every Other Tie Anchored (EOTA)

Field Measured Rail Break/Rail Cut Temp (°F)	**Measured Rail Gap (in)**																	
	0.5	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**	**7.5**	**8**	**8.5**	**9**
60	84	94	102	109	114	119	124	129	133	137	140	144	147	151	154			
55	79	89	97	104	109	114	119	124	128	132	135	139	142	146	149	152		
50	74	84	92	99	104	109	114	119	123	127	130	134	137	141	144	147	150	153
45	69	79	87	94	99	104	109	114	118	122	125	129	132	136	139	142	145	148
40	64	74	82	89	94	99	104	109	113	117	120	124	127	131	134	137	140	143
35	59	69	77	84	89	94	99	104	108	112	115	119	122	126	129	132	135	138
30	54	64	72	79	84	89	94	99	103	107	110	114	117	121	124	127	130	133
25	49	59	67	74	79	84	89	94	98	102	105	109	112	116	119	122	125	128
20	44	54	62	69	74	79	84	89	93	97	100	104	107	111	114	117	120	123
15	39	49	57	6	69	74	79	84	88	92	95	99	102	106	109	112	115	118
10	34	44	52	59	64	69	74	79	83	87	90	94	97	101	104	107	110	113
5	29	39	47	54	59	64	69	74	78	82	85	89	92	96	99	102	105	108
0	24	34	42	49	54	59	64	69	73	77	80	84	87	91	94	97	100	103
-5	19	29	37	44	49	54	59	64	68	72	75	79	82	86	89	92	95	98
-10	14	24	32	39	44	49	54	59	63	67	70	74	77	81	84	87	90	93
-15	9	19	27	34	39	44	49	54	58	62	65	69	72	76	79	82	85	88
-20	4	14	22	29	34	39	44	49	53	57	60	64	67	71	74	77	80	83
-25	-1	9	17	24	29	34	39	44	48	52	55	59	62	66	69	72	75	78
-30	-6	4	12	19	24	29	34	39	43	47	50	54	57	61	64	67	70	73
-35	-11	-1	7	14	19	24	29	34	38	42	45	49	52	56	59	62	65	68
-40	-15	-6	2	9	14	19	24	29	33	37	40	44	47	51	54	57	60	63
-45	-21	-11	-3	4	9	14	19	24	28	32	35	39	42	46	49	52	55	58
Estimated RNT in °F																		

Note: For rail temperatures above 60°F, the estimated RNTs must be developed by interpolating the existing table.

Table 1b. 5-1/2" Base Rail
Wood Tie Track / Every Other Tie Anchored (EOTA)

Field Measured Rail Break/Rail Cut Temp (°F)	**Measured Rail Gap (in)**																	
	0.5	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**	**7.5**	**8**	**8.5**	**9**
60	86	97	106	113	119	125	130	135	139	144	148	152	155					
55	81	92	101	108	114	120	125	130	134	139	143	147	150	154				
50	76	87	96	103	109	115	120	125	129	134	138	142	145	149	153			
45	71	82	91	98	104	110	115	120	124	129	133	137	140	144	148	151		
40	66	77	86	93	99	105	110	115	119	124	128	132	135	139	143	146	149	152
35	61	72	81	88	94	100	105	110	114	119	123	127	130	134	138	141	144	147
30	56	67	76	83	89	95	100	105	109	114	118	122	125	129	133	136	139	142
25	51	62	71	78	84	90	95	100	104	109	113	117	120	124	128	131	134	137
20	46	57	66	73	79	85	90	95	99	104	108	112	115	119	123	126	129	132
15	41	52	61	68	74	80	85	90	94	99	103	107	110	114	118	121	124	127
10	36	47	56	63	69	75	80	85	89	94	98	102	105	109	113	116	119	122
5	31	42	51	58	64	70	75	80	84	89	93	97	100	104	108	111	114	117
0	26	37	46	53	59	65	70	75	79	84	88	92	95	99	103	106	109	112
-5	21	32	41	48	54	60	65	70	74	79	83	87	90	94	98	101	104	107
-10	16	27	36	43	49	55	60	65	69	74	78	82	85	89	93	96	99	102
-15	11	22	31	38	44	50	55	60	64	69	73	77	80	84	88	91	94	97
-20	6	17	26	33	39	45	50	55	59	64	68	72	75	79	83	86	89	92
-25	1	12	21	28	34	40	45	50	54	59	63	67	70	74	78	81	84	87
-30	-4	7	16	23	29	35	40	45	49	54	58	62	65	69	73	76	79	82
-35	-9	2	11	18	24	30	35	40	44	49	53	57	60	64	68	71	74	77
-40	-14	-3	6	13	19	25	30	35	39	44	48	52	55	59	63	66	69	72
-45	-19	-8	1	8	14	20	25	30	34	39	43	47	50	54	58	61	64	67
Estimated RNT in °F																		

Note: For rail temperatures above 60°F, the estimated RNTs must be developed by interpolating the existing table.

Table 2a. 6" Base Rail
Wood or Concrete Tie Track / Every Tie Anchored (ETA)

Field Measured Rail Break/Rail Cut Temp (°F)	**Measured Rail Gap (in)**																	
	0.5	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**	**7.5**	**8**	**8.5**	**9**
60	90	102	111	119	126	133	139	144	149	154	159							
55	85	97	106	114	121	128	134	139	144	149	154	158						
50	80	92	101	109	116	123	129	134	139	144	149	153	157					
45	75	87	96	104	111	118	124	129	134	139	144	148	152	156				
40	70	82	91	99	106	113	119	124	129	134	139	143	147	151	155			
35	65	77	86	94	101	108	114	119	124	129	134	138	142	146	150	154		
30	60	72	81	89	96	103	109	114	119	124	129	133	137	141	145	149	153	
25	55	67	76	84	91	98	104	109	114	119	124	128	132	136	140	144	148	151
20	50	62	71	79	86	93	99	104	109	114	119	123	127	131	135	139	143	146
15	45	57	66	74	81	88	94	99	104	109	114	118	122	126	130	134	138	141
10	40	52	61	69	76	83	89	94	99	104	109	113	117	121	125	129	133	136
5	35	47	56	64	71	78	84	89	94	99	104	108	112	116	120	124	128	131
0	30	42	51	59	66	73	79	84	89	94	99	103	107	111	115	119	123	126
-5	25	37	46	54	61	68	74	79	84	89	94	98	102	106	110	114	118	121
-10	20	32	41	49	56	63	69	74	79	84	89	93	97	101	105	109	113	116
-15	15	27	36	44	51	58	64	69	74	79	84	88	92	96	100	104	108	111
-20	10	22	31	39	46	53	59	64	69	74	79	83	87	91	95	99	103	106
-25	5	17	26	34	41	48	54	59	64	69	74	78	82	86	90	94	98	101
-30	0	12	21	29	36	43	49	54	59	64	69	73	77	81	85	89	93	96
-35	-5	7	16	24	31	38	44	49	54	59	64	68	72	76	80	84	88	91
-40	-10	2	11	19	26	33	39	44	49	54	59	63	67	71	75	79	83	86
-45	-15	-3	6	14	21	28	34	39	44	49	54	58	62	66	70	74	78	81
Estimated RNT in °F																		

Note: For rail temperatures above 60°F, the estimated RNTs must be developed by interpolating the existing table.

Table 2b. 5-1/2" Base Rail
Wood or Concrete Tie Track / Every Tie Anchored (ETA)

Field Measured Rail Break/Rail Cut Temp (°F)	**Measured Rail Gap (in)**																	
	0.5	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**	**7.5**	**8**	**8.5**	**9**
60	92	106	116	125	133	139	146	152										
55	87	101	111	120	128	134	141	147	152									
50	82	96	106	115	123	129	136	142	147	153								
45	77	91	101	110	118	124	131	137	142	148	153							
40	72	86	96	105	113	119	126	132	137	143	148	152						
35	67	81	91	100	108	114	121	127	132	138	143	147	152					
30	62	76	86	95	103	109	116	122	127	133	138	142	147	151				
25	57	71	81	90	98	104	111	117	122	128	133	137	142	146	151			
20	52	66	76	85	93	99	106	112	117	123	128	132	137	141	146	150		
15	47	61	71	80	88	94	101	107	112	118	123	127	132	136	141	145	149	153
10	42	56	66	75	83	89	96	102	107	113	118	122	127	131	136	140	144	148
5	37	51	61	70	78	84	91	97	102	108	113	117	122	126	131	135	139	143
0	32	46	56	65	73	79	86	92	97	103	108	112	117	121	126	130	134	138
-5	27	41	51	60	68	74	81	87	92	98	103	107	112	116	121	125	129	133
-10	22	36	46	55	63	69	76	82	87	93	98	102	107	111	116	120	124	128
-15	17	31	41	50	58	64	71	77	82	88	93	97	102	106	111	115	119	123
-20	12	26	36	45	53	59	66	72	77	83	88	92	97	101	106	110	114	118
-25	7	21	31	40	48	54	61	67	72	78	83	87	92	96	101	105	109	113
-30	2	16	26	35	43	49	56	62	67	73	78	82	87	91	96	100	104	108
-35	-3	11	21	30	38	44	51	57	62	68	73	77	82	86	91	95	99	103
-40	-8	6	16	25	33	39	46	52	57	63	68	72	77	81	86	90	94	98
-45	-13	1	11	20	28	34	41	47	52	58	63	67	72	76	81	85	89	93
Estimated RNT in °F																		

Note: For rail temperatures above 60°F, the estimated RNTs must be developed by interpolating the existing table.

ATTACHMENT B

RECOMMENDED PROCEDURES FOR DISTRESSING CONTINUOUS WELDED RAIL (CWR) PREVIOUSLY LAID IN TRACK
(IN CONFORMANCE WITH SECTION 5.0 REQUIREMENTS)

(a) MassDOT's CWR Policy prescribes distressing requirements for newly installed CWR as per Section 3.0, including a general procedure for distressing rail.

   (1) **Attachment B provides more detailed Recommended Procedures for distressing CWR previously laid in track based on current industry best practice guidelines.**

(b) **Definition**: Distressing is the operation of removing (or sometimes adding) rail in CWR to make the longitudinal thermal stress (force) to be zero at a prescribed temperature.

   (1) MassDOT's preferred Rail Laying Temperature (RLT) is 105°F.

(c) **Common Distressing Types for Existing CWR in Track:**

   (1) There are typically three types, or categories, of distressing which are driven by specific maintenance needs:

      (i) **programmed distressing**,

      (ii) **reactive or emergency distressing**, and

      (iii) **curve distressing**. (Note: although curve distressing can be both programmed and reactive, a separate category is given here due to its general complexity).

   (2) **Programmed distressing** is when one or more strings of rail are deemed to be sufficiently below (or above) RLT to warrant rail neutral temperature (RNT) adjustment. When several strings require distressing on MassDOT-owned rail lines, often the out-of-face distressing shall be accomplished by a Contractor working directly for MassDOT Rail and Transit.

   (3) **Reactive or emergency distressing** is an imminent action that addresses tight, wavy, kinky rail, and other buckling prone conditions. This type of work on MassDOT-owned rail lines is usually accomplished by the Operating Railroad Personnel.

   (4) **Curve distressing** applies to stress adjustments of curves due to cold temperature chording-in or to excessive curve movements resulting from maintenance actions performed when rail is in tension. This type of work on MassDOT-owned rail lines is usually accomplished by Operating Railroad Personnel or by a Contractor working directly for MassDOT Rail and Transit.

(d) **General Guidelines for Programmed Distressing of CWR Strings In Track Up to 1600' In Length.**

   (1) **Programmed Distressing may be used for:**

      (i) Rail that was laid at colder temperatures sufficiently below a target RNT of 105°F; or

      (ii) Rail laid at "hot" temperatures, which exhibits excessive rail movement (running rail); or

      (iii) Locations where recent track maintenance (lining, surfacing, lifting, etc.) has lowered RNT below RLT -10°F or 95°F; or

(iv) Locations where the Operating Railroad and/or MassDOT Rail and Transit Division deems it necessary.

(2) The following applies when distressing:

(i) The means, methods, and equipment used when distressing rail shall be approved by MassDOT Rail and Transit or its representative.

(ii) The range of rail temperature at which rail is distressed shall be approved by MassDOT Rail and Transit or its representative.

(iii) Distressing should be scheduled and completed when the ambient temperature provides sufficient heat so that the rail temperature is as near as possible to the target RLT of 105°F; unless approved by MassDOT Rail and Transit.

(iv) **No more than 1,600' of rail may be distressed at any given time (1,600' strings).** This is a continuous 1600' string and/or a 1600' string with a cut or joint in the middle (800'+/- each side of cut and/or joint).

(3) The following preparatory work shall be performed:

(i) Make reference match marks around the existing joint or rail cut location:

- On the base of rail and tie plates on unanchored ties within 10'+/- of the joint and/or cut in the rail; or
- On the left side of the elastic fastener tie plate or the side opposite the drive on elastic fastener or clip within 10'+/- of the joint and/or cut in the rail; and

(ii) When distressing one or more strings, mark the quarter points of the string to be distressed.

(iii) When out-of-face distressing, set offset stakes at the far end of the rail to be distressed to measure any rail panel “pull” back at the end of the CWR string where the rail is cut and/or a joint is located.

(iv) Rail panel “pull back” is often associated with wood tie track anchored on every tie with elastic fasteners or in areas with weak crib ballast.

(v) Rail panel “pull back” movements (inches) shall be measured after:

- The rail has been correctly expanded at the quarter points and at the end by using the ambient temperature, a rail heater and/or a. hydraulic rail puller, and;
- The CWR string has been anchored and/or clipped.

(vi) Rail panel “pull back” measured is the same as ADDING RAIL and the CWR shall have to be unclipped and expanded again to eliminate any pull back when it is finally anchored and clipped before it is finally jointed and/or welded.

(vii) Measured rail end movements away from the joint or cut at the end of the CWR string at the match marks is the same as ADDING RAIL. The CWR shall have to be unclipped and expanded again to eliminate any rail end movement away from the joint and/or cut before the CWR is finally jointed and/or welded.

(viii) The total expansion length required, using the temperature differential, shall be calculated so as to achieve a target RLT of at least 105°F.

(ix) The amount of rail to be expanded when using the temperature differential moved can be determined by using the Report of Rail Clipping/Anchoring, Form “RC” found in Attachment E.

(x) To improve RNT, the total required expansion for any string, shall consist of the following:

- The calculated expansion required from the temperature "differential", and;
- Any measured "rail panel pull back", and;
- Any measured rail end movements away from the joint and/or cut.

(xi) If in compression, the rail shall be cut with a torch (see Paragraph (g) below) and placed in a position that will permit the rail ends to bypass each other, so as to permit the rail to expand freely.

(xii) If in compression, the rail shall be unanchored or unclipped from the cut or joint at the end of the string to be expanded back to the beginning of the string.

(xiii) If the base of rail is caught in the elastic rail fastener plates, the rail shall be raised from the tie plates or tie pads. Place base of rail on risers (spikes and/or rollers) to allow the rail to expand freely; risers shall be placed every 12th to 15th tie (especially in areas of elastic fastener plates). There may be a need to add additional risers at closer intervals on curves.

(xiv) If risers are required, all rail anchors, clips and insulators must be removed and risers placed to ensure the base of the rail is free to move relative to the tie plate and/or tie seat (i.e., stress free).

(xv) If power vibrators are used, it may not be necessary to place the rail on risers in areas of cut spikes and conventional tie plates.

(xvi) Ensure that vibrated rail is totally free to expand/contract longitudinally (i.e., stress free).

(e) **Programmed Distressing: Adjusting Short CWR Lengths (Spot Distressing) Already in Track in Wood and Concrete Tie Territory)**

(1) This method is generally used by the Operating Railroad MW forces to repair a service failure such as a pull-apart, broken rail, or broken weld and to remove a defective rail and/or add a plug rail or by making a cut in CWR.

(2) When distressing short lengths Operating Railroad MW forces generally use the ambient temperature and/or a rail puller to obtain the expansion required.

(3) In this case, the rail to be distressed should be centered, if possible, on an existing joint that can be removed and/or a cut made in the CWR string. Approximately 50% of the area to be distressed should be on either side of the joint and/or cut.

(4) In this case, the rail on either side of the joint and/or cut is expanded towards the rail cut and/or joint location.

(5) The base of the rail and plate should be marked at or within 10' of either side of the joint or cut and then at 50' stations or the quarter points for the full length of the rail to be expanded.

(6) Generally the amount of rail to be expanded on either side of the joint and/or cut is from 195' (380' total) to 390' (780' total). However, longer lengths of CWR, up to 800' (1600' total) may be distressed by this method.

(7) The movement at these stations should be recorded when the joint is removed and/or the rail is cut and recorded on Form "TD."

(8) A rail puller can be used, along with the ambient temperature and/or a heater, to increase the RNT, to at least **RLT -10°F**, when making repairs.

(9) Because of the need to expand rail in two directions, it may be somewhat easier to achieve the required expansion by using the ambient temperature in warmer periods of the year and/or by using a rail puller. A rail heater is more problematic because of the need to have the heater working on both sides of the joint and/or cut and having to move the heater over the joint or cut to expand rail in two directions.

(10) See Attachment C “Recommended Procedures for Adjusting CWR After a Break (Service Failure) or Cut Below the Target RLT (105°F).”

(f) **Programmed Distressing: Adjusting Numerous CWR Strings Out-of-Face Already in Track in Wood and Concrete Tie Territory (Preferred Method)**

(1) This procedure applies to distressing CWR in track as part of programmed maintenance when a length of rail(s) is deemed to be sufficiently below (or above) the target RLT of105°F to warrant RNT readjustment.

(2) The preferred way to expand rail is to heat the rail naturally or with a rail heater. A rail puller may be used when expanding rail to help achieve the required expansion and/or hold the expanded rail in place while installing anchors and/or clips.

(3) The rail to be distressed is usually expanded from the starting point to the end of the string being distressed in one continuous direction.

(4) The maximum length of rail to be distressed at any time in 1600’.

(i) Once a string to be distressed is identified, the end of the string at an existing joint, or a location where the rail is cut, shall have the rail ends mismatched to allow unobstructed movement of the rail string. Then, as the rail is heated naturally by sunlight and/or with a rail heater, the rail is expanded in the direction towards the joint and/or cut.

(ii) Before expanding the rail string, anchors, and/or clips shall be removed starting at the far end of the string at the joint and/or rail cut back to the beginning of the rail string.

(iii) Measure the existing rail temperature and subtract from the target RLT of at least 105°F to determine the temperature differential to be used. See the Report of Rail Clipping/Anchoring (Form “RC”) in Attachment E to calculate the total expansion required. The expansion required depends upon the rail temperature differential and total length of the CWR string. The required amount of expansion shall be marked at the one-quarter points on the base of the rail and plates.

(iv) Mark the quarter points on the base of the rail and tie plates of rail strings to be expanded.

(v) Expanding rail continuously in one direction allows MW crews to mark and expand rail at the quarter points and then re-clip rail in a continuous motion from the point of beginning to the end of the string at the joint and/or cut in the CWR.

(vi) Heat (natural or with a rail heater) should be uniformly applied along the string to be distressed until the required expansion has been obtained at the quarter points to include the end of the string at the joint and/or cut rail.

(vii) When using a rail heater, if any quarter point does not have the required expansion, either before or after anchoring/clipping, the string shall have to be reheated. The rail heater will back over the portion that needs to be reheated without applying heat.

(viii) Then the heater shall work towards the end of the string at the joint or rail cut applying heat until the required expansion is obtained.

- (ix) Re-clip and/or re-anchor the rail as soon as expansion at the quarter points has been achieved. Clip and/or anchor using the standard anchor patterns given in Section 4.0 “Anchoring of Rail.”
- (x) The CWR shall not be considered to be distressed until the required expansion at all the quarter points have been realized. When distressing strings of CWR, rail expansion, and not rail temperature, determines if a string of CWR has been distressed.
- (xi) A rail puller can be used to hold the required expansion and/or to help get the required expansion. At least 20 ties on the next string to be distressed should be solid box anchored and/or clipped to provide sufficient holing power for the rail puller to hold or pull the string being expanded.

(g) **Torch Cutting CWR in Track**

- (1) The preferred method of cutting CWR in compression is with a torch.
- (2) Rail shall only be torch cut in an emergency to relieve thermal stress in the rail prior to expanding and then cutting with a rail saw.
- (3) Operating Railroad personnel and/or Contractors shall be trained to cut rail with a torch in accordance with their in-house Safety Procedures.
- (4) Operating Railroad personnel and/or Contractors shall not cut rail with a torch on MassDOT property unless trained to do so by their respective companies.
- (5) A recommended procedure for torch cutting rail in compression is illustrated in Attachment F “Torch Cutting Rail.”
- (6) Person making torch cut:
  - (i) Shall stand on opposite side of rail from which it is expected to move when making torch cut.
  - (ii) In curve if buckle/alignment is on high side of curve; stand on low side of curve.
  - (iii) In tangent track, stand on side opposite from misalignment or buckle.
- (7) Initially, remove anchors only in an area large enough to facilitate the torch cut. Do not remove any additional anchors until the torch cut is made.
- (8) Clear personnel from misalignment area when rail is cut as rail/track may move suddenly when compressive stress is relieved by torch cutting.
- (9) Additional anchors shall be removed after the rail is torch cut to facilitate the necessary rail expansion movement, the misalignment of rail ends and repair.
- (10) If a torch cut rail is to be welded within 15 minutes of cutting, it shall be trimmed back at least 3/8" on each rail end with a saw before welding. **This practice requires the approval of the local MassDOT Rail and Transit Field Representative.**
- (11) All torch cut rail ends shall be trimmed back:
  - (i) At least 2" (AREMA Chapter 4.7.3) and/or;
  - (ii) Beyond the heat affected zone on either side of the torch cut which will appear as a different color on the web of the rail; or whichever is greater;
  - (iii) With a rail saw before a field weld is made and/or a joint is applied.
- (12) If necessary, in an emergency, to pass a train over a torch cut rail end, before the torch cut ends are trimmed back:
  - (i) Joint bars may be installed with at least two bolts in each rail end, if possible.

    (ii) Each train may be passed over the joint at a maximum of 10F/15P provided the move is under the supervision of a qualified person under FRA §213.217(a)(b)(c)(d).

(h) **Reactive or Emergency Distressing: Cutting Tight Track/CWR in Compression**

  (1) If a misalignment (wavy, kinky or nervous rail) is found in track that exceeds values for any class of track found in FRA §213.55, Alinement, take appropriate remedial action per FRA §213.9.

  (2) Locate point of maximum misalignment.

  (3) Fill out Form "TD" and include rail temperature and alinement deviation/defect as per FRA §213.55.

  (4) Select a point to make a torch cut. It may be advisable to cut at a point near, but not exactly at the center of the misalignment where compressive stresses may be the highest.

  (5) A recommended procedure for torch cutting rail in compression is illustrated in Attachment F "Torch Cutting Rail." See additional torch cutting information found in (g).

  (6) Make repairs in accordance with, "Reactive or Emergency Distressing" (see Example 3).

(i) **Reactive Distressing: Adjusting Tight, Wavy Nervous Rail: Procedures**

  (1) Reactive distressing consists of actions taken to address tight, wavy, kinky rail conditions seen in CWR track. Usually tight, wavy, or nervous rail is discovered when the rail temperatures are warm.

  (2) Such conditions typically are associated with large reductions in rail temperatures and indicate a possible imminent track buckle.

  (3) First establish the length of rail exhibiting the tight, wavy condition (i.e., the length of rail requiring neutral temperature adjustment through distressing).

  (4) **The total length for distressing is a recommended minimum of 1.5 times the estimated tight, wavy length (although 2 times is the MassDOT preferred).**

  (5) **Note: 400' of unfastening (200' either side of torch cut) is a *minimum* distance.** More length is required if the estimated $L_{distress}$ is longer than **260'**, in which case the unfastening length rule of thumb is:

Unfastening Length = 1.5 x $L_{distress}$

  (6) Generally *both* rails should be distressed unless otherwise dictated.

  (7) The procedure to follow is as described below.

    (i) Estimate the length of the tight, kink, wavy rail segment; locate the midpoint where rail is to be cut.

    (ii) Record the length of rail to be distressed (i.e., $L_{distress}$ = _____ ft.).

    (iii) Cut rail. (**Note: typically torch cutting is required)** and misalign rail ends.

    (iv) Keep cutting rail with rail saw until it stops moving; this may require several cuts.

    (v) **After rail stops moving, unfasten rail for minimum required distance on both sides of the cut starting at the cut and working away from the cut.**

    (vi) After unfastening CWR, continue cutting rail out until there is no more movement; at this point the rail ends should just be touching.

    (vii) Measure and record the rail temperature.

  - (viii) Refer to MassDOT's preferred RLT (105°F) and compare it with the measured rail temperature to determine the distress *temperature differential*. If the measured rail temperature is *lower* than the RLT, proceed to Form "RC," "Report of Rail Clipping/Anchoring" in Attachment E to determine the additional rail to be removed.
  - (ix) If the measured rail temperature is *above* RLT, no additional rail needs to be removed, and proceed to next step.
- (8) Rail shall be expanded by ambient temperature and/or pulled with a rail puller.
- (9) f CWR is cut with a torch, both rails on either side of the torch cut shall have to be cut back at least 2" with a rail saw (see Paragraph (g) above).
- (10) A plug rail **shall** have to be added. A minimum 18' plug in tangent track shall be installed.
- (11) Rail to be cut out when an 18' plug rail is installed includes:
  - (i) The length of the plug rail.
  - (ii) The amount that the rails on either side of the torch cut are to be expanded from Form "RC," "Report of Rail Clipping/Anchoring." See Attachment E.
  - (iii) An additional 1" allowance for each end of the plug if it is to be field welded (2x1" = 2").
  - (iv) If installed plug rail is to be jointed and not welded, no additional rail for welding needs to be removed. Comply with FRA §213.119(c).
  - **(v) DO NOT ADD RAIL**.
- (12) If field welding, add the weld allowance (usually 1") to the CWR rail expansion value and cut out the indicated amount of rail.
- (13) Make the weld or install joint bars and reapply rail fasteners or anchors. (Note: some pulling of the rail may be required to close rail to welding gap.)
- (14) Record distress temperature differential, distress length, unfastening length, the readjusted RNT, and the amount of rail removed on Form "TD."
- (15) Proceed to distress the other rail.

(j) Distressing Curves Procedures:

- (1) Curve distressing may be required in curves when curves have chorded in or moved in during cold temperatures or due to heavy maintenance activities in curves such as:
  - (i) Out-of-face surfacing and aligning of track
  - (ii) Out-of-face tie installation
  - (iii) Undercutting of track
  - (iv) Shoulder ballast cleaning
- (2) Heavy maintenance activities performed when CWR is in tension generally makes curve move in and/or chord in.
- (3) More specifically, when curves undergo lateral movements due to temperature changes, either naturally or due to maintenance, the result can be substantial changes in neutral temperature which requires readjustment by distressing.
- (4) There are two methods of distressing curves: (1) cutting rail out (preferred), and (2) curve realignment out.
- (5) Distressing via curve realignment is the easier of the two methods, but requires knowledge of the curve position (i.e., the amount of movement), hence, requires curve staking, monitoring, record keeping, and correct tamper lining management.

(6) Appendix “A” addresses the need to stake curves ≥3°. **At a minimum, curves ≥3° shall be staked when surfacing and aligning when the rail temperature is below 55°F or 50°F below the preferred RLT of 105°F.** See Form “TM,” “Report of Track Movement” in Attachment E.

(7) Staking of curves: At a minimum, stake curves ≥3° prior to out-of-face surfacing and lining.

(8) MassDOT Rail and Transit Division may require the staking of curves for other types of work as given in (j) (1).

(9) Place a minimum of three reference stakes uniformly spaced around the curve. Additional stakes may be required due to the overall length of the curve (see Form “TM,” Attachment E).

(10) Inspecting for curve movement: Inspect for curve movement periodically after the work, especially during periods of large temperature changes. **Where a curve has been staked and curve has chorded 3" or more (≥3") to the inside, the curve shall be lined out and/or distressed.**

(11) **A temporary speed restriction (TSR) of 40F/40P MPH or less shall be applied if the curve is not lined out or the rail is not distressed when the rail temperature reaches the target RLT of 105°F.** Take additional remedial action as required.

Example 1: Programmed Distressing (spot distressing): It is suspected that a 1,000' section of rail on wood ties with cut spikes and DSC plates and anchors was laid “cold” (well below the territory’s RLT), and it needs to be distressed to readjust to RLT = 105°F. The rail is being cut for distressing at a rail temperature of 70°F. How to proceed?

Step 1: Add match marks on both sides and within 10' of the rail to be cut. From these match marks determine the amount of rail moving together when the rail is cut. Place marks at 50' stations for up to 200' on either side of the proposed rail cut to monitor and record rail movement when rail is cut and then when rail is expanded to a RNT of 105°F.

Step 2: Add “witness stakes” in area where rail is to be cut. Measure any panel “pull back” on both sides of rail cut. Panel “pull back,” if any in inches, must be added to required rail expansion discussed below. **DO NOT ADD RAIL**

Step 3: For this example assume that the rail is in compression. Cut rail at midpoint with a rail saw if possible and bypass rail ends. If the rail is in compression, torch cutting may be required. If torch cutting is required an 18' plug or larger shall have to be cut in because the minimum cut back with a rail saw on either side of a torch cut is 2" or a minimum of 4" of rail plus the width of the torch cut is removed.

Step 4: For this example assume the rail was able to be cut with a saw. This means that the rail had a neutral temperature just below 70°F.

Step 5: From match marks determine amount of rail moving together.

Step 6: Unfasten 500' in both directions starting from the rail cut and working away from the rail cut. After anchors are removed, tap or vibrate rail and let rail continue to run. Place base of rail on spikes and/or rollers to get rail out of plates if that helps to expand rail. Add spikes and/or rollers starting at joint or cut and working backwards to beginning of string to be expanded.

Step 7: Record total rail movement on Form “TD” at a rail temperature of 70°F.

Step 8: Cut out the excess rail moved together, leaving the rail ends just touching. At this point this unfastened rail has a neutral temperature of 70°F which needs to be raised to RLT=105°F.

Step 9: Check rail temperature and refer to "Report of Rail Clipping/Anchoring," Form "RC" in Attachment E to compute required expansion in inches for a temperature differential of 105°F - 70°F = 35°F and calculate the gap required for two pieces at 500' or; 2 x 1-3/8" = 2-6/8" or 2-3/4".

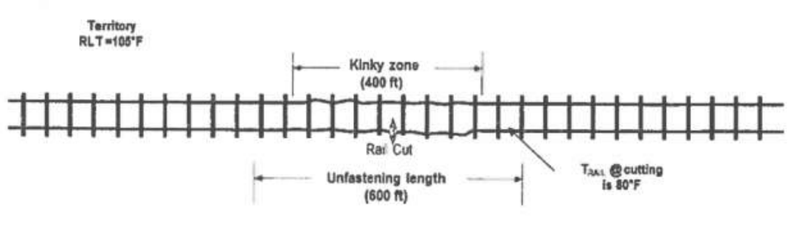
Step 10: Expand rail with ambient temperature and/or rail puller.

Step 11: Cut out the 2-3/4" + 1" for field weld allowance; pull the rail together for the 1" gap, field weld and reapply anchors.

Step 12: Record total amount of rail removed, distressing temperature, temperature differential, and the readjusted neutral temperature on Form "TD."

Step 13: Proceed to distress the other rail.

Example 2: Reactive Distressing: Adjusting Tight, Wavy, Nervous Rail: There is a 400' rail segment exhibiting a wavy/tight rail condition or rail kink. A kink is a formation or a misalignment greater than 1" on track not related to work done by MW Forces. A kink normally occurs when rail temperatures are thought to be high. The territory's RLT is 105°F, and the distressing is done at a rail temperature of 80°F. How to proceed with the distressing?



Step 1: Distress length is 400'; cut rail out with torch at midpoint until no more rail movement.

Step 2: Remove fasteners for 1.5 x kinky zone or 600' (300' on either side of cut note 600' = 1.5 x 400). Start at the torch cut and remove fasteners moving away from the cut. Keep letting rail run until no more rail movement.

Step 3: Measure rail temperature (here 80°F); and compare with RLT = 105°. The temperature differential is 25°F.

Step 4: Here the rail temperature is **lower** than laying temperature; therefore more rail needs to be removed. So rail needs to be expanded. See Form "RC," Attachment E.

Step 5: Proceed to Attachment E to determine additional rail to cut out for a 25°F distress temperature differential and the (2x300') 600' length, this is 1-1/4".

Step 6: Cut out the rail expansion required of 1-1/4" plus the 1" weld allowance if rail is to be field welded.

Step 7: If CWR is torch cut, both rails on either side of the torch cut shall have to be cut back at least 2" with a rail saw. Because only 1-¼" of expansion is required, a plug rail will have to be cut in. A minimum of 18' plug shall be installed in tangent track. Rail to be cut out if an 18' plug rail is installed includes:

- The length of the plug rail.
- The amount that the rails on either side of the torch cut are to be expanded from Form "RC." In this case 2 x 5/8" = 1-1/4" total.

- An additional 1" allowance for each end of the plug if it is to be field welded (2X1" = 2").
- If the plug is to be jointed and not welded, no additional rail other than the plug length and the required expansion amount of 1-¼" needs to be removed. Comply with FRA §213.119(c).
- **DO NOT ADD RAIL.**

Step 8: Expand rails (both sides of torch cut) by the ambient temperature and with a rail heater and/or rail puller, cut in plug rail, reapply anchors or fasteners, make field welds and/or drill rail ends and apply 6 hole joint bars.

Step 9: Record rail temperature (80°F); RLT (105°F); distress length (400'); unfastening length (600') and 1-1/4" rail cut out on Form "RC."

Step 10: Proceed to distress other rail.

ATTACHMENT C

RECOMMENDED PROCEDURES (RPS) FOR READJUSTING/DISTRESSING CONTINUOUS WELDED RAIL (CWR) AFTER A BREAK, PULL-APART (SERVICE FAILURE) OR CUT BELOW THE TARGET RAIL LAYING TEMPERATURE (RLT = 105°F)

(a) **Definitions:**

(1) The “Rail Laying Temperature” (RLT) is the target installation temperature of welded rail for the MassDOT Rail and Transit Division.

(2) For existing CWR in track, when service failures are repaired and cuts in CWR are made by Railroad Operating Companies, the minimum acceptable RLT to be achieved when making repairs and/or cuts is RLT -10°F or 95°F.

(3) All readjustments/distressing of CWR on MassDOT Rail and Transit Division shall be made to achieve a target RLT of at least 105°F.

(4) As per Section 3.0, “Installation and Adjustment of CWR,” MassDOT requires rail to be installed at RLT=105°F with construction tolerance of -10 to +10°F (i.e., 95°F to 115°F).

(5) The “Rail Neutral Temperature” (RNT) is the rail temperature at which the net longitudinal force in the rail is zero, and is referred to as rail neutral temperature.

(b) **Overview:**

(1) These procedures address readjusting the RNT under the following conditions:

(i) Service Failures:

- Broken joint bars
- Broken welds/field or plant
- Pull-aparts with broken bolts and bent bolts
- Broken rails
- Defective glued plug insulated joint rails

(ii) Rail defect or rail removals (cutting rail).

(iii) Cutting rails and installing plug rails.

(2) Rail that has pulled apart, broken, or been cut for defect removal must be readjusted to the RLT -10 safe range prior to rail temperatures exceeding those outlined in Table 1 below.

Table 1. Temperature When CWR (RNT) Must be Adjusted or Speed Restrictions Applied For Rail Breaks on One Rail Only

Rail Temperature (°F) at Which Rail Break or Cut Occurred	Rail Temperature (°F) at Which to Readjust or Apply Temporary Speed Restriction (TSR)
60	110*
50	110*
40	110*
30	110*
20	110*
10	110*
0	105*
-10	100*
-20	95*
-30	90*
*Table based on FRA/RSAC, but modified for MassDOT Rail and Transit Division requirements.	

Note: For the special case where both rails break and/or are cut within 200' of each other and when both rail's readjustment and permanent repairs are deferred to warm temperatures, the following formula shall apply:

T Return = (T RB1 + T RB2)/ 2 +70°F, and T Return shall not exceed 110°F.

(As an example, rail 1 breaks at 10°F, and rail 2 at 30° F, the return temperature is 90°F, and NOT as would be individually designated by Table 1)

(3) If rail RNT has not been adjusted prior to rail return temperatures exceeding the values in Table 1:

(i) **A temporary speed restriction (TSR) of not more than 25F/25P MPH shall be applied**, or

(ii) A temporary speed restriction of not more than 40F/40P MPH can be applied when a mandatory daily inspection is conducted during the heat of the day.

(iii) **If rail return temperatures do not exceed Table 1 values, the RNT shall be readjusted within 365 days.**

(4) The following data must be recorded on Form "TD" at the time of the break, pull-apart, and/or cut:

(i) Rail temperature at the time of the pull-apart/break/cut,

(ii) Gap size (as measured within ± 1/32"),

(iii) Rail size,

(iv) Tie type (wood or concrete),

(v) Anchor/fastener type (anchors or elastic fasteners); and the condition as described by "weak", "average", and "strong" as described below:

- Weak: missing anchors; the majority are not tight against the ties; evidence of rail slipping or moving longitudinally through anchors/clips;

crib ballast more than 2" below the tops of the ties; poor tie condition; more than half of the tie insulators are cracked, broken or not seated in the shoulder; tie pads are slipping or deteriorated; evidence of rail seat abrasion.

- Average: anchors are in place and tight against the ties; no evidence of rail creep; tie condition is good; full ballast section; most insulators are sound and seated correctly; tie pads are not worn or moving in the rail seat; no evidence of rail seat abrasion.
- Strong: new construction or relay rail with new anchors or fasteners; full ballast section and well consolidated AND which do not exhibit any of the "weak" or "average" characteristics.

(vi) The anchor pattern (every tie versus every other tie), and

(vii) If any "special conditions" apply* (see (5) below).

(5) Attachment A tables for the determination of pre-break/cut RNTs, do not apply for "special conditions" which are defined as:

(i) Breaks/cuts clustered in "close" proximity to each other on the same rail (i.e., within 800' of each other);

(ii) Breaks/cuts are within 400' of a "fixed" point; or

(iii) Breaks/cuts in iced rail/frozen ballast conditions.

(6) Use the tables in Attachment A to determine the pre-break/cut RNT, but note special conditions and/or exclusions (as above). Table 2 provides a guide as to the information found and where it is located in Attachment A (see below):

Table 2. Attachment A Table Use

Rail Base Size	Rail Weight	Anchorage Type	Attachment A Table to Use
6"	136/132	Every other tie anchored	1A
5-1/2"	115/100	Every other tie anchored	1B
6"	136/132	Every tie anchored*	2A*
5-1/2"	115/100	Every tie anchored*	2B*
* Use for concrete ties, and for wood ties with elastic fasteners.			

(7) 6" base rail found in Attachment A is currently the standard rail being purchased and installed by the MassDOT Rail and Transit Division.

(8) 5-½" base rail found in Attachment A was laid on MassDOT Rail and Transit owned rail lines and is still in track.

(c) **Procedures Used to Readjust Rail When A Service Failure Occurs and/or CWR Is Cut**

(1) The procedures used to readjust rail after a break or cut vary based upon Table 3's summary below.

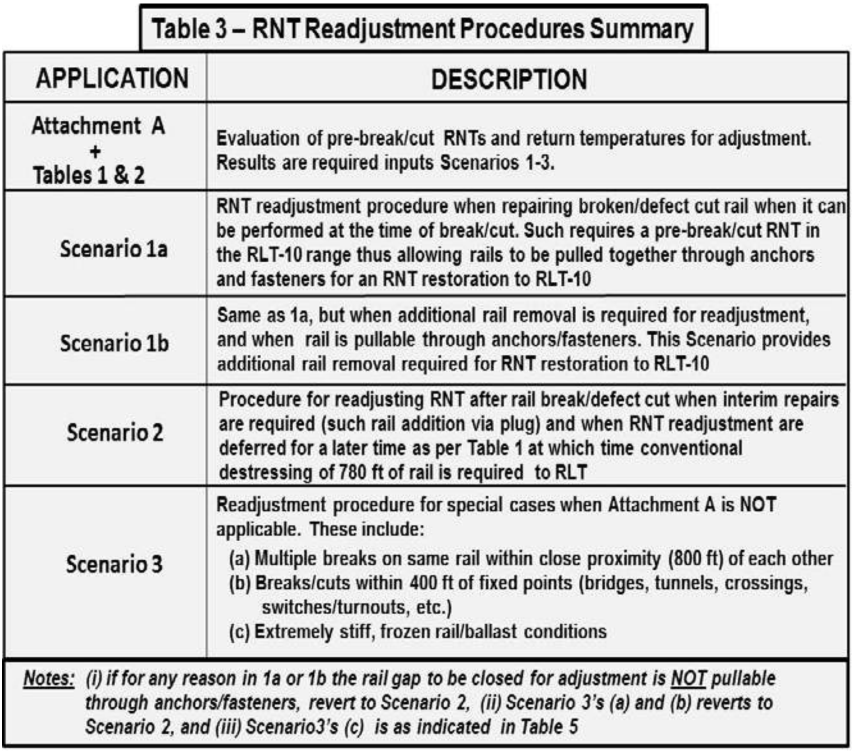


Table 3 – RNT Readjustment Procedures Summary

APPLICATION	DESCRIPTION
Attachment A + Tables 1 & 2	Evaluation of pre-break/cut RNTs and return temperatures for adjustment. Results are required inputs Scenarios 1-3.
Scenario 1a	RNT readjustment procedure when repairing broken/defect cut rail when it can be performed at the time of break/cut. Such requires a pre-break/cut RNT in the RLT-10 range thus allowing rails to be pulled together through anchors and fasteners for an RNT restoration to RLT-10
Scenario 1b	Same as 1a, but when additional rail removal is required for readjustment, and when rail is pullable through anchors/fasteners. This Scenario provides additional rail removal required for RNT restoration to RLT-10
Scenario 2	Procedure for readjusting RNT after rail break/defect cut when interim repairs are required (such rail addition via plug) and when RNT readjustment are deferred for a later time as per Table 1 at which time conventional destressing of 780 ft of rail is required to RLT
Scenario 3	Readjustment procedure for special cases when Attachment A is NOT applicable. These include: (a) Multiple breaks on same rail within close proximity (800 ft) of each other (b) Breaks/cuts within 400 ft of fixed points (bridges, tunnels, crossings, switches/turnouts, etc.) (c) Extremely stiff, frozen rail/ballast conditions

Notes: *(i) if for any reason in 1a or 1b the rail gap to be closed for adjustment is NOT pullable through anchors/fasteners, revert to Scenario 2, (ii) Scenario 3's (a) and (b) reverts to Scenario 2, and (iii) Scenario3's (c) is as indicated in Table 5*

(2) **Scenario 1a: Breaks or cuts occurring when the pre-break/neutral temperature was within the RLT -10°F range when a permanent repair is possible**. Repairs can be made at the time of the break/cut by pulling rail ends together with a rail puller without any removal of anchors or clips. Attachment A is used to determine existing and final (repaired) RNT.

(3) **Scenario 1b: Breaks or cuts occurring when the pre-break/cut neutral temperature was below the RLT -10°F range when a permanent repair is possible by cutting additional rail out**. Repairs can be made at the time of the break/cut by pulling rail ends together with a rail puller without any removal of anchors or clips. Attachment A is used to determine extra rail to cut out, and existing and final (repaired) RNT. If repairs cannot be made by pulling, then see Scenario 2 under (4).

(4) **Scenario 2: Breaks or cuts occurring, when permanent repairs cannot be made at the time of the break/cut.** If a plug is added (RAIL IS ADDED), or the rail pulled together and bolted as an interim repair, then permanent repairs or adjustments to the RNT shall be made before reaching the rail return temperature in Table 1, and by distressing 780' of rail.

Note that under this Scenario:

(i) the readjustment here is to RLT (and NOT to RLT-10), and

(ii) the potential benefit of the single joint interim repair approach versus the plug rail (i.e., offering the 1 weld vs. 2 welds later upon readjustment), and

(iii) the interim benefit of rail pulled together approach's resetting reduced RNT to the pre-break value.

(5) **Scenario 3: For "Special Cases"** where breaks or cuts occur:

(i) in close proximity on the same rail, or;

(ii) near fixed structures, or;

(iii) in extremely stiff or frozen rail/ballast conditions.

NOTES:

(a) **IN THE ABOVE CASES, TABLES IN ATTACHMENT "A" DO NOT APPLY (I.E. PRE-BREAK/CUT RNTs CANNOT BE DETERMINED.)**

(b) **SCENARIO 3 ADJUSTMENT OF RLT IS AS GIVEN IN SCENARIO 2 (I.E. REQUIRING RETURN TEMPERATURES AS PER TABLE 1, AND UNFASTENING/DISTRESSING 390' OF RAIL ON EITHER SIDE OF THE BREAK/CUT, OR 780' TOTAL, WITH THE EXCEPTION OF (iii) WHICH ADOPTS TABLE 5 FOR DISTRESS LENGTHS). SEE BELOW.**

(d) **Recommended Procedures to Readjust Rail RNT.** The procedures used to readjust rail after a break and/or service failure or cut are given below for the above Scenarios:

(1) **Scenario 1a: Single Break/Cut Occurred when the RNT was Within 10° of the RLT (105°-10=95°F), when a permanent repair is possible at the time of break/cut. Note the following:**

(i) Rail can be pulled together through the anchors or fasteners and the gap can be closed. A minimal amount of anchors are removed around the service failure and/or at the cut in CWR.

(ii) Permanent repair is made when service failure is discovered or CWR is cut.

(iii) RNT is restored to within the range of RLT -10°F.

(iv) No rail is added.

(v) No additional repairs are required (except for repositioning displaced anchors/fasteners resulting from rail pulling).

(vi) Following are the steps to be followed when making a repair:

- Step 1: Obtain the rail temperature at the time of the break/cut, gap size, rail size, tie type (wood or concrete), anchor/fastener type, and the anchor pattern (every tie versus every other tie) and record on Form "TD."
- Step 2: Use Table 2 above to determine which table in Attachment A should be used to determine the pre-break/cut RNT.
- Step 3: determine if the pre-break/cut temperature is within 10°F of the RLT. If so, proceed to Step 5.
- Step 4: If not, proceed to Scenario 1b or 2 depending upon the conditions.
- Step 5: No adjustment is required for breaks or cuts that occurred when the pre-break/cut RNT was within the RLT -10°F. The gap can be closed using the following procedures:
  - Remove a limited number of anchors or fasteners (~5-10 ties) either side of the break/cut (to facilitate an easier rail pull).
  - Cut 1" for the weld allowance if the rail ends are to be welded.

- Use a rail puller to close the gap or to leave the 1" weld allowance. If the gap closes, apply joint bars or make the weld and record all pertinent data.
- If the gap does not close, close the gap by adding a plug rail. Record the gap size, temperature, and the rail added, and return later to readjust using Scenario (2).
- After applying joint bars or making the weld, record the gap size, pre-break/cut RNT, the restored RNT and rail temperature on Form "TD." Permanent repairs at the service failure, break and/or cut location shall be made within 30 days in accordance with FRA §213.119(c)(3).
- If working in a curve, proceed to check alignment to be sure rail has not chorded in after pulling rail with a rail puller. Realign if necessary.

(vii) Above procedure requires pulling rail through the anchors or fasteners; hence, needing sufficient puller/tensor capacity especially in concrete tie track or on wood ties with elastic fasteners. If puller capacity is not adequate or puller is not available, use procedures in Scenario 2

(viii) MassDOT Rail and Transit Division requires that all permanent repairs that can be made immediately (Scenario 1), be accomplished by adjusting RNT to at least RLT -10°F or 95°F.

(ix) ILLUSTRATIVE EXAMPLE OF SCENARIO 1a:

Consider a rail break or defect removal on wood tie, every other tie anchored (EOTA) 136# rail segment, when the rail broke/cut at 40°F, and the resulting gap size is 3 inches. How to make the repair/readjustment?

ANSWER: from Table 1a (ATTACHMENT "A") the pre-break cut RNT is: 99°F. This is within MassDOT's RLT-10 safe range (i.e. within 105 – 10), hence a candidate for Scenario 1a! After cutting an extra inch for the weld allowance, close the gap to the 1" weld gap via rail puller (without any anchor removal), and proceed to make the weld. Record all pertinent data, and be sure to reposition any moved/displaced anchors. Then the readjusted RNT here is 99°F.

Note: if for any reason the rail could not be pulled together, proceed to make an interim repair via a plug rail requiring adding 3" of rail, and then apply Scenario 2 to readjust before rail temperature exceed 110°F (as per Table 1)

(2) **Scenario 1b: Single Break/Cut RNT is below the RLT -10°F Range (<95°F), when a permanent repair is still possible. Note the following:**

(i) This is a modification of Scenario 1a as it requires more rail to be cut out to compensate for the RNT being below RLT -10°F. As such, this requires pulling rail together through "*larger*" gaps. The gap now consists of the sum of present break/cut gap, and the additional rail removal required to compensate for pre-break/cut RLT being below RLT -10°F as well as the 1" weld allowance if field welding. The **Required Steps When RNT is below RLT -10°F Range (<95°F):**

- Step 1: Measure/record the rail temperature at the time of the break/cut, gap size, rail size, tie type (wood or concrete), anchor/fastener type, and the anchor pattern (every tie versus every other tie) and record on Form "TD."

- Step 2: Use Table 2 information to choose appropriate table in Attachment A to determine the pre-break/cut RNT.
- Step 3: Determine if the pre-break/cut temperature is below the RLT - 10°F. If so proceed to Step 4. If above the RLT -10°F range, proceed to Scenario 1a depending on the conditions and schedule readjustments in compliance with the rail return temperature in Table 1. **Step 4: Use the selected table in Attachment A to determine the *additional* amount of rail to cut out to readjust to at least 95°F.** Add this amount rail to be removed to the existing gap size plus the 1" weld allowance, if a weld is to be made~~.~~ This is known as the final pull-gap amount (i.e., FG.).
- Step 5: Determine if FG is *pullable,* with the rail puller on site, to the 1" gap required for welding or closing the gap if joint bars are to be added~~,~~ remembering that rail is to be pulled through the anchors/fasteners without removal. If gap is pullable, proceed to Step 6.
- Step 6: Cut out additional rail required for expansion and closing the joint by adding joint bars or by field welding. Pull rail through the anchors to close the gap for joint bars and/or leave 1" to close with a field weld.
- Step 7: If required gap cannot be closed, there are two possible temporary repairs. They are:
  - Only close the gap that was found in the field when the rail broke and/or was cut. The RNT will be the existing RNT when the rail broke and/or was cut as determined from Attachment A. Return to make permanent repair in accordance with Scenario 2 and Step 8.
  - If initial gap observed when rail broke and/or was cut cannot be closed, add rail by installing a plug rail. The RNT will be the existing rail temperature when the rail broke and/or was cut. Return to make permanent repair in accordance with Scenario 2.
- Step 8 After making permanent repairs as in Step 6, inspect fasteners and readjust (reposition anchors) where necessary so they are tight against the tie.
- Step 9: If working in a curve, proceed to check the alignment to determine if the rail has chorded in. Realign if necessary and or take appropriate remedial action.

(3) ILLUSTRATIVE EXAMPLE OF SCENARIO 1b:

Consider a 136# rail is cut for a defect removal at a rail temperature of 20°F in an every tie fastened rail segment resulting in a rail gap of 2". The territory's designated laying temperature is 105°F. How to make readjustment in line with the RLT-10 criterion at the time of defect cut?

Answer: apply Scenario 1b (as illustrated below)

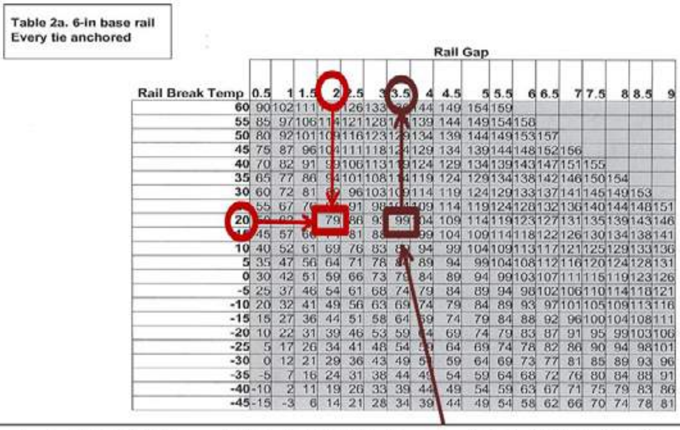


Table 2a. 6-in base rail
Every tie anchored

Rail Break Temp	**Rail Gap**																	
	0.5	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**	**7.5**	**8**	**8.5**	**9**
60	90	102	111	[illegible]	126	133	[illegible]	144	149	154	159							
55	85	97	106	114	121	128	[illegible]	139	144	149	154	158						
50	80	92	101	109	116	123	129	134	139	144	149	153	157					
45	75	87	96	104	111	118	124	129	134	139	144	148	152	156				
40	70	82	91	99	106	113	119	124	129	134	139	143	147	151	155			
35	65	77	86	94	101	108	114	119	124	129	134	138	142	146	150	154		
30	60	72	81	[illegible]	96	103	109	114	119	124	129	133	137	141	145	149	153	
[illegible]	55	67	[illegible]	[illegible]	91	98	[illegible]	109	114	119	124	128	132	136	140	144	148	151
20	[illegible]	[illegible]	[illegible]	79	86	[illegible]	99	[illegible]	109	114	119	123	127	131	135	139	143	146
[illegible]	45	57	[illegible]	[illegible]	81	[illegible]	[illegible]	99	104	109	114	118	122	126	130	134	138	141
10	40	52	61	69	76	83	[illegible]	94	99	104	109	113	117	121	125	129	133	136
5	35	47	56	64	71	78	[illegible]	89	94	99	104	108	112	116	120	124	128	131
0	30	42	51	59	66	73	[illegible]	84	89	94	99	103	107	111	115	119	123	126
-5	25	37	46	54	61	68	74	79	84	89	94	98	102	106	110	114	118	121
-10	20	32	41	49	56	63	69	74	79	84	89	93	97	101	105	109	113	116
-15	15	27	36	44	51	58	64	[illegible]	74	79	84	88	92	96	100	104	108	111
-20	10	22	31	39	46	53	59	[illegible]	69	74	79	83	87	91	95	99	103	106
-25	5	17	26	34	41	48	54	[illegible]	64	69	74	78	82	86	90	94	98	101
-30	0	12	21	29	36	43	49	[illegible]	59	64	69	73	77	81	85	89	93	96
-35	-5	7	16	24	31	38	44	[illegible]	54	59	64	68	72	76	80	84	88	91
-40	-10	2	11	19	26	33	39	44	49	54	59	63	67	71	75	79	83	86
-45	-15	-3	6	14	21	28	34	39	44	49	54	58	62	66	70	74	78	81

Pre break RNT is 79°F hence NOT in the RLT-10 safe range of 95 to 105°F. BUT 99°F at a 3.5" gap is! Hence cut an extra 1.5" leaving a new gap of 3.5". Cut an additional 1" for the weld allowance; pull rail to close gap to 1" without fastener removal and weld. This rail has been readjusted to 99°F and to within the RLT-10 range as required!

(e) **Procedures to Readjust Rail RNT for Scenario 2**

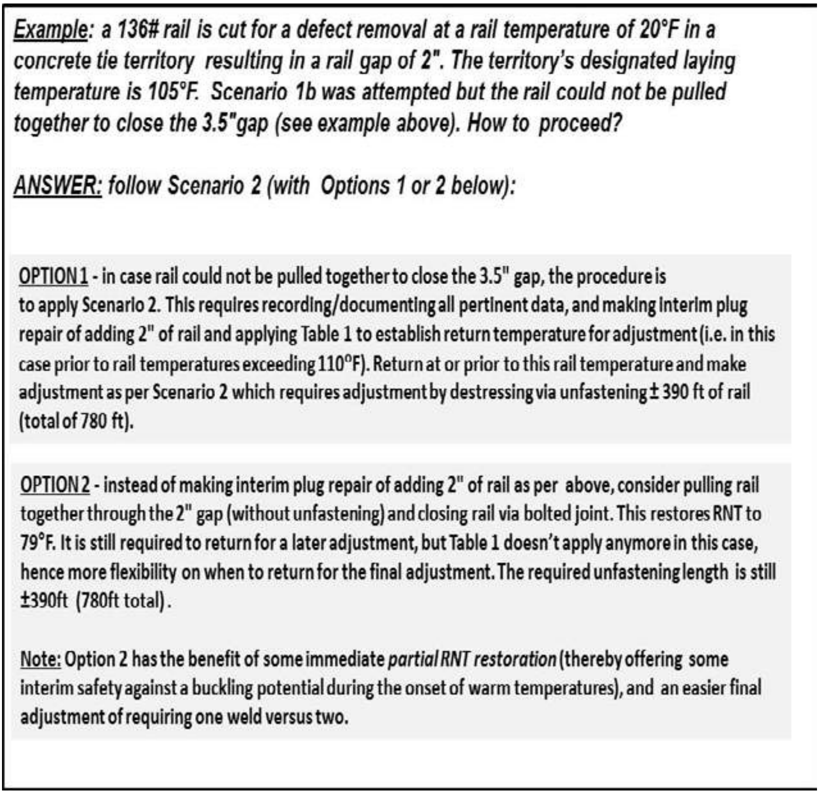
(1) Scenario 2: Breaks or cuts occurring when permanent repairs cannot be made at the time of the break/cut. If a plug is added as an interim fix, then permanent repairs or adjustments to the RNT shall be made before reaching the rail return temperature in Table 1.

(i) Step 1: Use Attachment A Tables to document pre-break RNTs.

(ii) Step (2): **If a plug rail is cut in, record the amount of rail added on Form "TD."**

(iii) Step (3): A special requirement of Scenario 2 is to distress by removing anchors or clips on 390' of CWR on both sides of plug or joint (for a total of 780') when returning for repair, and readjusting to RLT of 105 **°F** (and not to RLT-10)

(2) ILLUSTRATIVE EXAMPLE OF SCENARIO 2:



***Example**: a 136# rail is cut for a defect removal at a rail temperature of 20°F in a concrete tie territory resulting in a rail gap of 2". The territory's designated laying temperature is 105°F. Scenario 1b was attempted but the rail could not be pulled together to close the 3.5"gap (see example above). How to proceed?*

***ANSWER:** follow Scenario 2 (with Options 1 or 2 below):*

OPTION 1 - in case rail could not be pulled together to close the 3.5" gap, the procedure is to apply Scenario 2. This requires recording/documenting all pertinent data, and making interim plug repair of adding 2" of rail and applying Table 1 to establish return temperature for adjustment (i.e. in this case prior to rail temperatures exceeding 110°F). Return at or prior to this rail temperature and make adjustment as per Scenario 2 which requires adjustment by destressing via unfastening ± 390 ft of rail (total of 780 ft).

OPTION 2 - instead of making interim plug repair of adding 2" of rail as per above, consider pulling rail together through the 2" gap (without unfastening) and closing rail via bolted joint. This restores RNT to 79°F. It is still required to return for a later adjustment, but Table 1 doesn't apply anymore in this case, hence more flexibility on when to return for the final adjustment. The required unfastening length is still ±390ft (780ft total).

Note: Option 2 has the benefit of some immediate *partial RNT restoration* (thereby offering some interim safety against a buckling potential during the onset of warm temperatures), and an easier final adjustment of requiring one weld versus two.

(f) **Procedures to Readjust Rail RNT for Scenario 3 (Special Cases) when:**

(1) Case 1: Multiple breaks/cuts occurring in "close" proximity on the same rail (i.e., within 800' of each other).

(2) Case 2: Breaks/cuts within 400' of "fixed structures/locations."

(3) Case 3: Breaks/cuts in iced rail/frozen ballast conditions.

(4) Case 4: Where the break/cut occurs on both rails within 200' of each other.

(5) For detailed readjustment procedure for Special Cases 1 and 2 above refer to conventional distressing procedure and application of Scenario 2 as in (e) above, requiring the adjustment of 780' of rail and cutting rail out as dictated by the temperature differential (TD).

(6) Use Table 4 below with the caveat that additional rail removal may be required if the end points at ±390 are measured to be moving in when applying the rail puller to close the gap.

Table 4. Special Cases: Additional Rail to Remove for Readjustment for the 780' of Unfastening Length

Temperature Differential (°F)*	**Additional Rail to Remove (inches)**
5	1/4
10	1/2
15	1
20	1-1/4
25	1-1/2
30	1-3/4
35	2-1/4
40	2-1/2
45	2-3/4
50	3-1/4
55	3-1/2
60	3-3/4
65	4
70	4-1/2
*MassDOT Rail and Transit Division Preferred Rail Laying Temperature (RLT=105°F)	

Note: The above procedures for Scenario 2 and Scenario 3"s Special Cases 1 and 2 are based on best practice engineering assumption, that for **all** rail break/defect cut/pull-apart cases, **one** unfastening length of 390' on either side of the cut/break is adequate for readjustments. Although some break/cut influence zones can be longer, hence requiring longer unfastening lengths, the 780' total length is an acceptable "best practice" compromise. For "*bad*" breaks (i.e., break gaps exceeding 3"), longer unfastening lengths are recommended. Additionally, note that the above Scenario 2 procedure readjusts to RLT instead of the RLT -10°F value! This is for "added safety" to counteract the "*one unfastening length of ± 390' satisfying all break/cut influence zone"* assumption.

(g) **Procedures to Readjust Rail RNT Scenario 3:** For Special Case 3 (breaks/cuts in frozen rail/ballast conditions):

(1) Apply Scenario 2 as per (e) above; however, the recommended unfastening lengths are reduced as per Table 5 below.

(2) Use Form "RC" in Attachment E to calculate the required expansion amounts that correspond to the unfastening lengths given in Table 5.

Table 5. Unfastening Lengths for Frozen Ballast Conditions

Measured Gap Size (in) when Broke/Cut	Unfastening Length (ft) in Each Direction
<1/2	100
½ - 1	150
>1	200

(h) **Procedures to Readjust Rail RNT Scenario 3:** For Special Case 4 where the break/cut occurs on both rails within 200' of each other.

(1) Use Scenarios 1-3 as applicable for rail breaks on each individual rail.

(2) The return/readjustment time (return rail temperature) given in Table 1 is not applicable for this Special Case 4 when both rails have breaks in close proximity (within 200' of each other).

(3) The following formula must be used to determine the "return rail temperature."

$$T_{RETURN} = (T_{RB_1} + T_{RB_2})/2 + 70°F$$

Where T_{RB1} is the rail break temperature of one rail, and T_{RB2} is the rail break temperature of the other (opposite) rail.

(4) Example: One rail breaks or is cut for defect removal at 10°F and left for a later adjustment in line with Scenarios 2 or 3. The other rail breaks or is cut later at 30°F which is also deferred for later return adjustment. If both repairs were not made at the time of the rail break and/or cut, but were deferred to at a later date, then the return temperature is at/below a rail temperature of 90°F. The calculation is shown below:

$$T_{RETURN} = (10°F + 30°F)/2 + 70°F \text{ or } 20°F + 70°F = 90°F$$

Note that this is a lower return temperature than either individual breaks/cut temperature given by Table 1.

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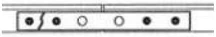
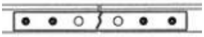
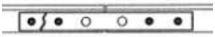
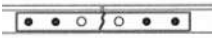
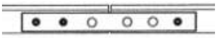
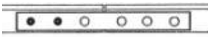
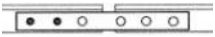
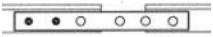
ATTACHMENT D

JOINT DEFECT GUIDELINES / MAXIMUM ALLOWABLE TEMPORARY SPEED RESTRICTIONS (TSR's)

Joint Defect Guidelines in CWR Track

Condition	FRA Part 213 Reference	Illustration****	Action
One Broken Joint Bar Not Between Middle Holes	§213.121(b) §213.121(e)		10F/15P MPH* (per FRA §213.9(b))
One Broken Joint Bar Between Middle Holes	§213.121(c)		Out of Service until Repaired (per FRA §213.9(b)) and Visually Supervise**
Both Joint Bars Broken Not Between Middle Holes	§213.121(b) §213.121(e)		10F/15P MPH* (per FRA §213.9(b))
Both Joint Bars Broken Between Middle Holes	§213.121(c)		Out of Service until Repaired (per FRA §213.9(b))and Visually Supervise**
Less than Two Bolts in Rail End	§213.121(e)		10F/15P MPH* (per FRA §213.9(b))
Unbolted Rail End Pulled Apart 1-1/2" - 2"	§213.121(e)		Inspect (per FRA §213.9(b)) Repair within 24 hrs.
Unbolted Rail End Pulled Apart 2" - 4"	§213.121(e)		Visually Supervise** Must maintain continuous communications w/train crew (per FRA §213.9(b)) Repair within 24 hrs.
Unbolted Rail End Pulled Apart >4"	§213.121(e)		Out of Service until Repaired

Notes:

* All speeds shown are maximum allowable. Qualified employees may impose more stringent remedial action (FRA §231.7(a)(b)(c)(d)), depending on the presence of a combination of defects or particular site conditions.

** "Visually supervise" means that an employee qualified under FRA §213.7(a)(b)(c) must observe each operation over the defect and/or in accordance with FRA §213.7(d).

*** Solid circle is bolt hole with bolt. Open circle is bolt hole without bolt.

****Track surface and joint tie conditions shall be considered when determining temporary slow order (TSO) maximum speeds.

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ATTACHMENT E

PREPARATION OF FORMS

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FORM "TD"
REPORT OF DISTURBANCE OF CWR TRACK

Part A: CWR Track Disturbance Due to Track Work					
Route:		**Date:**		**Rail Temp**	**Time:**
M.P. Location From:		**To:**		**Track No:**	
Type of Work Performed:					
Additional Repairs Required:					
Remedial Action Required:					
Part B: Rail Cut Or Service Failure in CWR Territory					
Route:		**Date:**		**Rail: North / South / East / West**	
M.P. Location From:		**To:**		**Track No:**	
Type of Work Performed:					
Additional Repairs Required:					
Remedial Action Required:					
Operating Railroad Employee (Print):					
Operating Railroad Employee (Signature):					

ATTACHMENT E

INSTRUCTIONS FOR PREPARATION OF THE REPORT OF DISTURBANCE OF CWR TRACK (FORM "TD")

A report of disturbed track , Form "TD", shall be made out as required by Section 10.0. The report will be completed and signed by the Contractor/Operating Railroad Employee in charge of the work as follows:

Part A - This part will be completed in its entirety any time heavy maintenance work is performed on CWR track. See Section 6.0, "Trackwork that Disturbs CWR Track and the Protection of Disturbed Track" for the information required on Form "TD", Part A.

Part B - This part will be completed any time main track CWR is cut or broken and/or there is a service failure.

A. See Section 5.0, "Maintenance of the Desired Rail Neutral Temperature in Previously Installed CWR" for the information required on Form "TD", Part B.

B. See Attachment C, "Recommended Procedures for Readjusting Continuous Welded Rail (CWR), After a Break, Pull-Apart (Service Failure) or Cut Below the Target Rail Laying Temperature (105°F)" for the information required on Form "TD", Part B.

C. See Attachment A, "Determination of Estimate of Pre-Break/Pre-Cut Neutral Temperature for a Service Failure in CWR" for the information required on Form "TD", Part B.

Parts A & B

A. Form "TD" shall be filled out in accordance with Section 10.0, "Reporting Requirements for CWR Track."

B. Form "TD" shall be filled out and kept by the Operating Railroad in accordance with Section 11.0, "Record Keeping."

FORM "TM"
REPORT OF TRACK MOVEMENT: CURVES >3°

Route:		**Type of Work Performed*:**	**Surfacing** ☐ **Install Ties** ☐	**Date of Work:**	
M.P. Location :	**From:**		**To:**	**Track No:**	
Curve No:		**Degree of Curve:**		**Elevation:**	
Rail Temperature at which Surfacing Tie Installation was Done:					

Distance from Reference
(Reference Points Must be no Further than 200 ft. apart):

Reference Point Number	Location of Reference Point	Before Work	After Work	Movement	Within 7 Days	Movement
TS (Tangent to Spiral Tag)						
SC (Spiral to Curve Full Body Tag)						
Additional Full Body Tag As Required**						
Additional Full Body Tag As Required**						
CS (Curve to Spiral Full Body Tag)						
ST (Spiral to Tangent Tag)						
Uniform Movement	----------	----------				

***Types of work that requires a Form "TD." Out-of-face surfacing and alinement and installing more than 540 ties per mile.**

Railroad Employee Making Measurements (Print Name): ____________________

Railroad Employee Making Measurements (Signature): ____________________

Railroad Employee in Charge of Surfacing (Print Name): ____________________

Railroad Employee in Charge of Surfacing (Signature): ____________________

**Use additional sheets if the number of stations exceeds the number of lines.

ATTACHMENT E

INSTRUCTIONS FOR PREPARATION OF THE REPORT OF TRACK MOVEMENT DUE TO SURFACING OR OUT-OF-FACE TIE RENEWAL
(FORM "TM")

(a) In curves of 3° or over, prior to the start of high speed surfacing, or installing more than 540 ties per mile, the Operating Railroad and/or Contractor shall set reference points each curve at the locations given on Form "TM" along the gage side of the high rail of the curve.

In no case may the points be more than 200' apart.

(1) In no case will the points be more than 200' apart.

(2) In addition, offset stakes shall be set at each of the reference mark locations. These stakes will be set to the outside (high side) of the track, and out of the way of regulators or other equipment.

(3) In multiple track locations, a mark on the high rail or a tack in a tie on an adjacent and/or parallel track, may be used as an offset location.

(4) Adjacent and/or parallel tracks may be used for offset locations only if the track is not to be disturbed or will have any maintenance work performed when it is being used as for offset locations.

(5) Initial measurements shall be made from the reference points to the offset locations before any heavy maintenance work (The "Work") is performed and shall be recorded on Form "TM".

(b) Immediately after completion of the Work, the Operating Railroad Employee in charge of the track surfacing or tie installation will again measure and record the distances from the reference point to the offset locations. Both the distances and any movement shall be recorded on Form "TM".

(c) Within seven days after the Work, the Operating Railroad will again measure and record the distance from the reference point to the offset locations. Again, both distances and movement shall be recorded on Form "TM".

(d) If the curve has moved and/or chorded in at any location is 3" or more ($\geq$3"), the curve shall be distressed by lining out and/or distressing the rail prior.

(e) The lining out of the curve and/or distressing of the curve shall be accomplished before:

(1) If the ambient temperature is greater than 80°F (rail temperature greater than a temperature of 110°F), no work shall be done unless it is an emergency or as directed by MassDOT Rail and Transit Division and; or

(2) If the ambient temperature and/or rail temperature is less than 40°F, all work will be suspended unless it is an emergency or directed by the MassDOT Field Representative.

(f) **Temporary Speed Restriction:** A temporary speed restriction (TSR) shall be placed if the curve has moved inward 3" or more in accordance with Section 6(e), until the curve is lined out and/or distressed. The curve will be considered to have lost its neutral temperature if movement is recorded as given below:

Curves 3° and Over	Measured Curve Movement that Requires Lining Out the Curve and/or Distressing the Rail
	3" or greater ($\geq$3") to the inside

FORM "JE"
REPORT OF JOINT ELIMINATION BY FIELD WELDING
THERMITE (T) / FLASH BUTT (FB)

Track Name/No.	Rail (N/S/E/W)	MP	Rail Weight	Date/ Weld No.	Field Weld Type[2]	Mold Date	Portion Date	Weld Company/ Welder's Name	Weather/ Rail Temp °F	Rail Cut Out / or Consumed and/or Added (Inches)	Remarks	Weld Inspections			Results
												Date Inspected	Inspection Company	Test Results	

Notes:
(1) Reason for weld:
  EJ – Eliminate Joint
  EPR – Eliminate Plug Rail
  EDW – Eliminate Defective Weld
  RNT – Increase Rail Neutral Temperature
(2) Field Weld Types:
  T – Thermite
  FB – Flash butt
(3) A Form "TD" shall be made out when rail is cut and/or broken.

Operating Railroad Contractor's Signature: ____________________ **Date:** ____________

Operating Railroad Contractor's Name (Print): ____________________

ATTACHMENT E

INSTRUCTIONS FOR THE PREPARATION OF THE REPORT OF JOINT ELIMINATION BY FIELD WELDING (FORM “JE”)

(a) A Report of Joint Elimination by Field Welding shall be made out as required in Section 10.0. The report shall be completed by the Contractor/Operating Railroad Employee in charge of the work.

FORM “RC”
REPORT OF RAIL CLIPPING/ANCHORING

Operating Railroad/Contractor:	**Weather:**
Line Segment:	**Copy sent to MassDOT Rail and Transit Division (Yes/No)”**

Date	**Rail**[6]	**String Number**	**Start MP**	**End MP**	**String Length (Feet)**	**Rail Temp (°F)**(1)	**Required Temp. Change (°F)**(2)	**Required Expansion (Inches)**(3)	**Method of Expansion**(5)	**String Vibrated (Y/N)**	**Time Started/ Finished Clipping**	**Actual Expansion Recorded (Inches) Obtained at ¼ Points**(4)				**Notes**
												1/4	**1/2**	**3/4**	**Full**	

Notes:
(1) Temperature to be measured with approved rail thermometer.
(2) Required temperature change in °F is preferred RNT of 105°F minus the actual rail temperature at the time of expansion.
(3) See formula and table on reverse side of Form.
(4) After string is anchored and/or clipped.
(5) Method of Expansion: Natural (N); Rail Heater (RH); Rail Puller (RP); Cooled (C).
(6) Rail locations” N, S, E, W

Operating Railroad Contractor’s Signature: ______________________________ **Date:** ____________________

Operating Railroad Contractor’s Name (Print): ______________________________

ATTACHMENT E

INSTRUCTIONS FOR THE PREPARATION OF THE REPORT OF RAIL CLIPPING/ANCHORING (FORM “RC”)

Formula for Coefficient of Linear Expansion of Rail:

$A = 0.000078 \times (T_D – T_E) \times L$

A = Adjustment or Required Expansion amount for rail string (in inches)
T_D = Desired RNT which should be 105°F if possible as conditions permit
T_E = Existing or Actual Rail Temperature (°F) prior to heating or expansion measured with an approved rail thermometer
L = Length of string to be adjusted (in feet)

Calculations:

Change in Rail Length Due to Change in Rail Temperature

A = Change in Rail Length in Inches = 0.000078ΔT x L
L = Length of Rail to be Expanded in Feet
ΔT = Change in Temperature in Degrees Fahrenheit: Desired RNT minus Actual Rail Temperature

Length of Rail (ft)	**Change in Temperature in Degrees Fahrenheit**															
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
	Change in Rail Length in Inches															
100	1/8	1/8	1/8	1/4	1/4	1/4	3/8	3/8	3/8	1/2	1/2	1/2	5/8	5/8	5/8	5/8
200	1/8	1/4	1/4	3/8	1/2	1/2	5/8	5/8	3/4	7/8	7/8	1	1-1/8	1-1/8	1-1/4	1-1/4
300	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2	1-5/8	1-3/4	1-7/8	1-7/8
400	1/4	3/8	1/2	5/8	7/8	1	1-1/8	1-1/4	1-1/2	1-5/8	1-3/4	1-7/8	2-1/8	2-1/4	2-3/8	2-1/2
500	1/4	1/2	5/8	7/8	1	1-1/4	1-3/8	1-5/8	1-7/8	2	2-1/4	2-3/8	2-5/8	2-3/4	3	3-1/8
600	1/4	1/2	3/4	1	1-1/4	1-1/2	1-3/4	1-7/8	2-1/8	2-3/8	2-5/8	2-7/8	3-1/8	3-3/8	3-5/8	3-3/4
700	3/8	5/8	7/8	1-1/8	1-3/8	1-3/4	2	2-1/4	2-1/2	2-3/4	3-1/8	3-3/8	3-5/8	3-7/8	4-1/8	4-3/8
800	3/8	5/8	1	1-1/4	1-5/8	1-7/8	2-1/4	2-1/2	2-7/8	3-1/8	3-1/2	3-3/4	4-1/8	4-3/8	4-3/4	5
900	3/8	3/4	1-1/8	1-1/2	1-7/8	2-1/8	2-1/2	2-7/8	3-1/4	3-5/8	3-7/8	4-1/4	4-5/8	5	5-3/8	5-5/8
1000	1/2	7/8	1-1/4	1-5/8	2	2-3/8	2-3/4	3-1/8	3-5/8	4	4-3/8	4-3/4	5-1/8	5-1/2	5-7/8	6-1/4
1100	1/2	7/8	1-3/8	1-3/4	2-1/4	2-5/8	3-1/8	3-1/2	3-7/8	4-3/8	4-3/4	5-1/4	5-5/8	6-1/8	6-1/2	6-7/8
1200	1/2	1	1-1/2	1-7/8	2-3/8	2-7/8	3-3/8	3-3/4	4-1/4	4-3/4	5-1/4	5-5/8	6-1/8	6-5/8	7-1/8	7-1/2
1300	5/8	1-1/8	1-5/8	2-1/8	2-5/8	3-1/8	3-5/8	4-1/8	4-5/8	5-1/8	5-5/8	6-1/8	6-5/8	7-1/8	7-5/8	8-1/8
1400	5/8	1-1/8	1-3/4	2-1/4	2-3/4	3-3/8	3-7/8	4-3/8	5	5-1/2	6-1/8	6-5/8	7-1/8	7-3/4	8-1/4	8-3/4
1440	5/8	1-1/8	1-3/4	2-1/4	2-7/8	3-3/8	4	4-1/2	5-1/8	5-5/8	6-1/4	6-3/4	7-3/8	7-7/8	8-1/2	9
1600	5/8	1-1/4	1-7/8	2-1/2	3-1/8	3-3/4	4-3/8	5	5-5/8	6-1/4	6-7/8	7-1/2	8-1/8	8-3/4	9-3/8	10

FORM "CWR"

REPORT OF SEMI-ANNUAL INSPECTION (SPRING/FALL) OF CWR TRACK

Operating Railroad/Contractor:	**Weather:**
Line Segment:	**Copy sent to MassDOT Rail and Transit Division (Yes/No):**

Track No.	**Rail (N/S/E/W)**	**MP (Start)**	**MP (Finish)**	**Ties**		**Ballast**		**Anchors**			**Longitudinal Rail Movement**					**Remarks/ Remedial Action Required**
				Type	**Condition**	**Crib**	**Shoulder**	**Type**	**Pattern**	**Position**	**Turnouts**	**Crossovers**	**Grade X-ings**	**Open Deck Bridges**	**Other**	

Operating Railroad Contractor's Signature: ______________________________ **Date:** ____________________

Operating Railroad Contractor's Name (Print): ____

ATTACHMENT E

INSTRUCTIONS FOR THE PREPARATION OF THE REPORT OF SEMI-ANNUAL INSPECTION (SPRING/FALL) OF CWR TRACK

(FORM "CWR")

(a) A Report of Semi-Annual Inspection (Spring/Fall) of CWR Tack shall be filled out as required in Section 10.0. The report shall be completed by the Operating Railroad Employee making the inspection.

ATTACHMENT F

TORCH CUTTING RAIL (FIGURE/REMARKS)

(a) General: Cutting Continuous Welded Rail (CWR) In Compression:

  (1) Cut rail with a torch any time the existing rail temperature is suspected of being above the Rail Neutral Temperature (RNT) and/or the rail is in tension.

  (2) Rail in compression has many forms to include:

    (i) Tight rail

    (ii) Nervous/wavy rail

    (iii) Kinky rail

    (iv) Misaligned track

    (v) Buckled track

  (3) The area where the rail is in compression may exhibit the following characteristics:

    (i) Rail is lifting out of the tie plates; or,

    (ii) Rail is bunching and/or crowding shoulders of the tie plates; or,

    (iii) Rail is moving longitudinally in anchors and/or elastic fasteners; or,

    (iv) Ties are skewing; or,

    (v) Crib and/or shoulder ballast is pushing due to longitudinal and/or lateral track movement; or,

    (vi) There are numerous consecutive high spikes; or

    (vii) The rail appears to be kinking; or

    (viii) One rail appears to be straighter than the other opposite rail; or

    (ix) There is noticeable variation in track gage.

(b) The Contractor and Operating Railroad shall have their own specific Safety Procedures developed for torch cutting rail.

(c) The Contractor and/or Operating Railroad shall designate personnel that are qualified and are trained on an annual basis to torch cut rail using the above Safety Procedures.

(d) Minimum Recommended Procedures When Torch Cutting CWR:

  (1) Locate the area where the rail appears to be in compression; and

  (2) If the track is already misaligned and/or buckled:

    (i) Line track out at misalignment and/or buckle to reduce compressive stresses in the rail; and

    (ii) Make cut away from misalignment and/or buckle area to make cut in an area of potentially reduced compressive forces.

  (3) In all cases, make the torch cut, as shown below, before removing any spikes, lags or fasteners; and

  (4) In all cases, make the torch cut, as shown below, before removing any joints and/or anchors or elastic fasteners; and,

  (5) In all cases, make the torch cut in the rail as described and shown below.

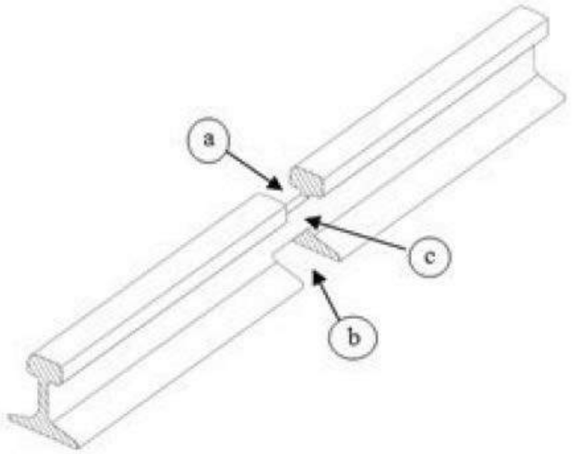
(e) Torch Cutting Rail In Compression: Use the so called “H” Pattern Method:

  (1) First, cut and remove the rail head as shown in “a”; then

(2) Second, cut and remove both sides of the base as shown in “b”; then

(3) Third, cut and remove the remaining portion of the web from the top of the web near the rail head towards the base of the rail as shown in “c”.

(4) Note: Removing the rail head and then both sides of the rail base, before removing the web of the rail, is preferred, in order, if possible, to minimize excessive vertical and/or lateral movement of the rail when the rail is cut.



(f) After Torch Cutting Rail:

- (1) If the rail that is torch cut is to be field welded and/or jointed:
  - (i) Trim or cut back the torch cut rail ends with a rail saw.
  - (ii) Remove all indication of the torch cut and/or heat affected zone which can be accomplished by:
    - Cutting back a minimum of 2" behind the torch cut on each rail end (AREMA Chapter 4); and/or
    - Cutting back the heat affected zone from behind the torch cut on each rail end;
    - Use whichever cut back amount is larger.
  - (iii) Also see Attachment B, Paragraph (g) “Torch Cutting CWR in Track.”

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APPENDIX B

UNDERBALANCE TABLES MAXIMUM ALLOWABLE OPERATING SPEED ON CURVES

APPENDIX B

UNDERBALANCE TABLES
MAXIMUM ALLOWABLE OPERATING SPEED ON CURVES

Page

Table 1 3" Underbalance Table.. B-1

Notes:

(a) The enclosed tables can be used to determine V_{max} in accordance with FRA §213.57.

(b) The Chief Engineer shall maintain a list of curves and the designated “underbalance” to be used.

(c) To operate at speeds which use “underbalance” greater than 3", the equipment must be qualified and approved by the Federal Railroad Administration.

(d) The Chief Engineer shall authorize all elevations in excess of 4".

Table 1.
Maximum Allowable Operating Speed on Curves
Underbalance = 3" (E_u)

Degree Curve (D)(1)	Degree Curve (D)(2)	Superelevation in inches (E_a)			
		0-0	0-1/4	0-1/2	0-3/4
		Speed in Miles Per Hour (V_{max})			
0° 10'	0.17	90	90	90	90
0° 20'	0.33	90	90	90	90
0° 30'	0.50	90	90	90	90
0° 40'	0.67	80	83	86	89
0° 50'	0.83	71	74	77	80
1° 00'	1.00	65	68	70	73
1° 15'	1.25	58	60	63	65
1° 30'	1.50	53	55	57	59
1° 45'	1.75	49	51	53	55
2° 00'	2.00	46	48	50	51
2° 15'	2.25	43	45	47	48
2° 30'	2.50	41	43	44	46
2° 45'	2.75	39	41	42	44
3° 00'	3.00	37	39	40	42
3° 15'	3.25	36	37	39	40
3° 30'	3.50	34	36	37	39
3° 45'	3.75	33	35	36	37
4° 00'	4.00	32	34	35	36
4° 15'	4.25	31	33	34	35
4° 30'	4.50	30	32	33	34
4° 45'	4.75	30	31	32	33
5° 00'	5.00	29	30	31	32
5° 30'	5.50	27	29	30	31
6° 00'	6.00	26	27	28	29
6° 30'	6.50	25	26	27	28
7° 00'	7.00	24	25	26	27
7° 30'	7.50	23	24	25	26
8° 00'	8.00	23	24	25	25
8° 30'	8.50	22	23	24	25
9° 00'	9.00	21	22	23	24
9° 30'	9.50	21	22	22	23
10° 00'	10.00	20	21	22	23
10° 30'	10.50	20	21	21	22
11° 00'	11.00	19	20	21	22
11° 30'	11.50	19	20	20	21
12° 00'	12.00	18	19	20	21
12° 30'	12.50	18	19	20	20
13° 00'	13.00	18	18	19	20
13° 30'	13.50	17	18	19	19
14° 00'	14.00	17	18	18	19
14° 30'	14.50	17	17	18	19
15° 00'	15.00	16	17	18	18

(1) In degrees and minutes
(2) In decimals

Table 1.
Maximum Allowable Operating Speed on Curves
Underbalance = 3" (E_u)

Degree Curve (D)(1)	Degree Curve (D)(2)	Superelevation in inches (E_a)			
		1	1-1/4	1-1/2	1-3/4
		Speed in Miles Per Hour (V_{max})			
0° 10'	0.17	90	90	90	90
0° 20'	0.33	90	90	90	90
0° 30'	0.50	90	90	90	90
0° 40'	0.67	90	90	90	90
0° 50'	0.83	82	85	87	90
1° 00'	1.00	75	77	80	82
1° 15'	1.25	67	69	71	73
1° 30'	1.50	61	63	65	67
1° 45'	1.75	57	58	60	62
2° 00'	2.00	53	55	56	58
2° 15'	2.25	50	51	53	54
2° 30'	2.50	47	49	50	52
2° 45'	2.75	45	46	48	49
3° 00'	3.00	43	44	46	47
3° 15'	3.25	41	43	44	45
3° 30'	3.50	40	41	42	44
3° 45'	3.75	39	40	41	42
4° 00'	4.00	37	38	40	41
4° 15'	4.25	36	37	38	39
4° 30'	4.50	35	36	37	38
4° 45'	4.75	34	35	36	37
5° 00'	5.00	33	34	35	36
5° 30'	5.50	32	33	34	35
6° 00'	6.00	30	31	32	33
6° 30'	6.50	29	30	31	32
7° 00'	7.00	28	29	30	31
7° 30'	7.50	27	28	29	30
8° 00'	8.00	26	27	28	29
8° 30'	8.50	25	26	27	28
9° 00'	9.00	25	25	26	27
9° 30'	9.50	24	25	26	26
10° 00'	10.00	23	24	25	26
10° 30'	10.50	23	24	24	25
11° 00'	11.00	22	23	24	24
11° 30'	11.50	22	22	23	24
12° 00'	12.00	21	22	23	23
12° 30'	12.50	21	22	22	23
13° 00'	13.00	20	21	22	22
13° 30'	13.50	20	21	21	22
14° 00'	14.00	20	20	21	22
14° 30'	14.50	19	20	21	21
15° 00'	15.00	19	20	20	21

(1) In degrees and minutes
(2) In decimals

Table 1.
Maximum Allowable Operating Speed on Curves
Underbalance = 3" (E_u)

Degree Curve (D)(1)	**Degree Curve (D)**(2)	**Superelevation in inches (E_a)**			
		2	**2-1/4**	**2-1/2**	**2-3/4**
		Speed in Miles Per Hour (V_{max})			
0° 10'	0.17	90	90	90	90
0° 20'	0.33	90	90	90	90
0° 30'	0.50	90	90	90	90
0° 40'	0.67	90	90	90	90
0° 50'	0.83	90	90	90	90
1° 00'	1.00	84	86	88	90
1° 15'	1.25	75	77	79	81
1° 30'	1.50	69	70	72	74
1° 45'	1.75	63	65	67	68
2° 00'	2.00	59	61	62	64
2° 15'	2.25	56	57	59	60
2° 30'	2.50	53	54	56	57
2° 45'	2.75	50	52	53	54
3° 00'	3.00	48	50	51	52
3° 15'	3.25	46	48	49	50
3° 30'	3.50	45	46	47	48
3° 45'	3.75	43	44	45	46
4° 00'	4.00	42	43	44	45
4° 15'	4.25	40	42	42	43
4° 30'	4.50	39	40	41	42
4° 45'	4.75	38	39	40	41
5° 00'	5.00	37	38	39	40
5° 30'	5.50	36	36	37	38
6° 00'	6.00	34	35	36	37
6° 30'	6.50	33	33	34	35
7° 00'	7.00	31	32	33	34
7° 30'	7.50	30	31	32	33
8° 00'	8.00	29	30	31	32
8° 30'	8.50	28	29	30	31
9° 00'	9.00	28	28	29	30
9° 30'	9.50	27	28	28	29
10° 00'	10.00	26	27	28	28
10° 30'	10.50	26	26	27	27
11° 00'	11.00	25	26	26	27
11° 30'	11.50	24	25	26	26
12° 00'	12.00	24	25	25	26
12° 30'	12.50	23	24	25	25
13° 00'	13.00	23	24	24	25
13° 30'	13.50	23	23	24	24
14° 00'	14.00	22	23	23	24
14° 30'	14.50	22	22	23	23
15° 00'	15.00	21	22	22	23

(1) In degrees and minutes
(2) In decimals

Table 1.
Maximum Allowable Operating Speed on Curves
Underbalance = 3" (E_u)

Degree Curve (D)(1)	Degree Curve (D)(2)	Superelevation in inches (E_a)			
		3	3-1/4	3-1/2	3-3/4
		Speed in Miles Per Hour (V_{max})			
0° 10'	0.17	90	90	90	90
0° 20'	0.33	90	90	90	90
0° 30'	0.50	90	90	90	90
0° 40'	0.67	90	90	90	90
0° 50'	0.83	90	90	90	90
1° 00'	1.00	90	90	90	90
1° 15'	1.25	82	84	86	87
1° 30'	1.50	75	77	78	80
1° 45'	1.75	69	71	72	74
2° 00'	2.00	65	66	68	69
2° 15'	2.25	61	62	64	65
2° 30'	2.50	58	59	60	62
2° 45'	2.75	55	56	58	59
3° 00'	3.00	53	54	55	56
3° 15'	3.25	51	52	53	54
3° 30'	3.50	49	50	51	52
3° 45'	3.75	47	48	49	50
4° 00'	4.00	46	47	48	49
4° 15'	4.25	44	45	46	47
4° 30'	4.50	43	44	45	46
4° 45'	4.75	42	43	44	45
5° 00'	5.00	41	42	43	43
5° 30'	5.50	39	40	41	41
6° 00'	6.00	37	38	39	40
6° 30'	6.50	36	37	37	38
7° 00'	7.00	34	35	36	37
7° 30'	7.50	33	34	35	35
8° 00'	8.00	32	33	34	34
8° 30'	8.50	31	32	33	33
9° 00'	9.00	30	31	32	32
9° 30'	9.50	30	30	31	31
10° 00'	10.00	29	29	30	31
10° 30'	10.50	28	29	29	30
11° 00'	11.00	27	28	29	29
11° 30'	11.50	27	27	28	28
12° 00'	12.00	26	27	27	28
12° 30'	12.50	26	26	27	27
13° 00'	13.00	25	26	26	27
13° 30'	13.50	25	25	26	26
14° 00'	14.00	24	25	25	26
14° 30'	14.50	24	24	25	25
15° 00'	15.00	23	24	24	25

(1) In degrees and minutes
(2) In decimals

Table 1.
Maximum Allowable Operating Speed on Curves
Underbalance = 3" (E_u)

Degree Curve (D)(1)	Degree Curve (D)(2)	Superelevation in inches (E_a)			
		4	4-1/4	4-1/2	4-3/4
		Speed in Miles Per Hour (V_{max})			
0° 10'	0.17	90	90	90	90
0° 20'	0.33	90	90	90	90
0° 30'	0.50	90	90	90	90
0° 40'	0.67	90	90	90	90
0° 50'	0.83	90	90	90	90
1° 00'	1.00	90	90	90	90
1° 15'	1.25	89	90	90	90
1° 30'	1.50	81	83	84	85
1° 45'	1.75	75	76	78	79
2° 00'	2.00	70	71	73	74
2° 15'	2.25	66	67	69	70
2° 30'	2.50	63	64	65	66
2° 45'	2.75	60	61	62	63
3° 00'	3.00	57	58	59	60
3° 15'	3.25	55	56	57	58
3° 30'	3.50	53	54	55	56
3° 45'	3.75	51	52	53	54
4° 00'	4.00	50	50	51	52
4° 15'	4.25	48	49	50	51
4° 30'	4.50	47	47	48	49
4° 45'	4.75	45	46	47	48
5° 00'	5.00	44	45	46	47
5° 30'	5.50	42	43	44	44
6° 00'	6.00	40	41	42	42
6° 30'	6.50	39	39	40	41
7° 00'	7.00	37	38	39	39
7° 30'	7.50	36	37	37	38
8° 00'	8.00	35	35	36	37
8° 30'	8.50	34	34	35	36
9° 00'	9.00	33	33	34	35
9° 30'	9.50	32	33	33	34
10° 00'	10.00	31	32	32	33
10° 30'	10.50	30	31	31	32
11° 00'	11.00	30	30	31	31
11° 30'	11.50	29	30	30	31
12° 00'	12.00	28	29	29	30
12° 30'	12.50	28	28	29	29
13° 00'	13.00	27	28	28	29
13° 30'	13.50	27	27	28	28
14° 00'	14.00	26	27	27	28
14° 30'	14.50	26	26	27	27
15° 00'	15.00	25	26	26	27

(1) In degrees and minutes
(2) In decimals

Table 1.
Maximum Allowable Operating Speed on Curves
Underbalance = 3" (E_u)

Degree Curve (D)(1)	Degree Curve (D)(2)	Superelevation in inches (E_a)				
		5	**5-1/4**	**5-1/2**	**5-3/4**	**6**
		Speed in Miles Per Hour (V_{max})				
0° 10'	0.17	90	90	90	90	90
0° 20'	0.33	90	90	90	90	90
0° 30'	0.50	90	90	90	90	90
0° 40'	0.67	90	90	90	90	90
0° 50'	0.83	90	90	90	90	90
1° 00'	1.00	90	90	90	90	90
1° 15'	1.25	90	90	90	90	90
1° 30'	1.50	87	88	89	90	90
1° 45'	1.75	80	82	83	84	85
2° 00'	2.00	75	76	77	79	80
2° 15'	2.25	71	72	73	74	75
2° 30'	2.50	67	68	69	70	71
2° 45'	2.75	64	65	66	67	68
3° 00'	3.00	61	62	63	64	65
3° 15'	3.25	59	60	61	62	62
3° 30'	3.50	57	58	58	59	60
3° 45'	3.75	55	56	56	57	58
4° 00'	4.00	53	54	55	55	56
4° 15'	4.25	51	52	53	54	55
4° 30'	4.50	50	51	51	52	53
4° 45'	4.75	49	49	50	51	52
5° 00'	5.00	47	48	49	50	50
5° 30'	5.50	45	46	46	47	48
6° 00'	6.00	43	44	44	45	46
6° 30'	6.50	41	42	43	43	44
7° 00'	7.00	40	41	41	42	42
7° 30'	7.50	39	39	40	40	41
8° 00'	8.00	37	38	38	39	40
8° 30'	8.50	36	37	37	38	38
9° 00'	9.00	35	36	36	37	37
9° 30'	9.50	34	35	35	36	36
10° 00'	10.00	33	34	34	35	35
10° 30'	10.50	32	33	34	34	34
11° 00'	11.00	32	32	33	33	34
11° 30'	11.50	31	32	32	32	33
12° 00'	12.00	30	31	31	32	32
12° 30'	12.50	30	30	31	31	32
13° 00'	13.00	29	30	30	31	31
13° 30'	13.50	29	29	29	30	30
14° 00'	14.00	28	29	29	29	30
14° 30'	14.50	28	28	28	29	29
15° 00'	15.00	27	28	28	28	29

(1) In degrees and minutes
(2) In decimals

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APPENDIX C

GLOSSARY

APPENDIX C

GLOSSARY

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APPENDIX C

GLOSSARY

- A -

Adjusting/De-stressing
The procedure by which a rail's temperature is re-adjusted to the desired neutral temperature range. It typically consists of cutting the rail and removing rail anchoring devices, which provides for the necessary expansion, and then re-assembling the track.

Alignment – General
The physical appearance of the railroad as viewed from above, which consists of a series of straight lengths of track, referred to as tangents and spirals, connecting simple, compound or reverse curves.

Alignment-Line
The condition of track in regard to uniformity of direction over short distances on tangents and in curves.

Aggregate
The sand, gravel, broken stone or combinations thereof with which the cementing material is mixed to form a mortar or concrete. The fine material used to produce mortar for stone and brick masonry and for the mortar component of concrete is commonly termed "fine aggregate," while the coarse material used in concrete only is termed "course aggregate."

- B -

Ballast
Select material placed on the roadbed to support and hold track in line and surface. Ballast preferably consists of sized hard particles that distribute the load, drains well and maintains proper line and surface.

Ballast Cleaning
The process of separating contaminants from the ballast by shaking and then depositing stone back onto the track.

Ballast Section
The cross section of a track between and under the crossties and between the ballast shoulders.

Ballast Shoulder
The portion of ballast between the end of the tie and the bottom of the ballast slope. It distributes the traffic load over a greater width of roadway and helps hold the track in alignment by providing lateral resistance.

Bar - Joint
Bars that are used to physically connect two rail ends and ensure proper rail head and gage face alignment. Also called a joint bar.

Batter - Rail
Deformation of the surface of the rail head, usually close to the end of the rail, caused generally by wheel impact loads.

Braking Force
The longitudinal and lateral force induced into the rail as a result of the brake application of a train.

Bridge - Ballast Deck
A bridge with a solid floor provided with drains and covered with ballast to provide uniform support for track.

Bridge Timber
A sawed tie usually pre-framed on all four sides and of the size and length required for track on an open deck bridge.

Buckling Incident
The formation of a lateral misalignment sufficient in magnitude to cause a general instability of track which may constitute a deviation from Class requirements specified in §213.55 of Part I. These normally occur when rail temperatures are relatively high and are caused by high longitudinal compressive forces.

- C -

Cant
Tilt or inclination of the base of the rail. Canting of the rail is achieved with the use of a tie plate or rail seat designed to cant the rail inward towards the center-line of track and should be installed accordingly. Typical cant is 1:40.

Clip
An elastic fastener that is applied parallel or perpendicular to the base of the rail and replaces and eliminates the need for a cut spike and anchor. A clip can be used on wood or concrete ties.

Clip - Switch
The device by which the switch rod is joined to the switch points. It is normally connected to the switch points by bolts protected by cotter keys or pins. It sometimes has staggered bolt holes in the horizontal leg for making detailed adjustments in the positions of the switch points.

Closure Rail
The lead rails connecting the heel end of the switch with the toe ends of a frog.

Coefficient of Thermal Expansion – Rail
A multiplier based on the physical properties of rail steel used to calculate the change in rail length with change in temperature. The coefficient is 0.000078 when the length of the rail is in feet.

Compression
A uniform axial force within the rail caused by equal and opposite forces pushing at the ends of the rail.

Compromise Joint Bar
See Joint Bar – Compromise

Continuous Welded Rail (CWR)
Rail that has been welded together into lengths exceeding 400 feet. See Part I, §213.119.

Crossing – At Grade (Highway)
A crossing or intersection of a railroad and a highway at the same level or grade.

Crossing – At Grade (Track)
A structure, used where one track crosses another at grade, which consists of four connected frogs. Crossing angles can be defined as:

Low angle:	Up to and including 30°
Medium angle:	31° to 60°
High angle:	61° to 90°

Crosslevel
The difference in elevation between the rails at the same location.

Crossover
Two turnouts with the track connected at their frogs, arranged to form a passage between two nearby and generally parallel tracks.

Curvature - Degree of
A measure of the sharpness of a simple curve where a 1" offset at the mid-point of a 62' chord is equal to 1°.

Curve - Compound
A curve composed of two or more simple curves that are joined by easement spirals and that lead in the same general direction (i.e., to left or right, but each with different radii).

Curve - Reverse
A curve composed of two simple curves that are joined by a common tangent point or by a short tangent track which bear in opposite directions.

Curve - Simple (Horizontal)
A curve in the form of a circular arc that is bounded by two tangents. By definition these curves do not have spirals and may be found in yards and on secondary track.

Curve - Vertical
A curve in the profile of a track to connect intersecting grade lines and to permit safe and smooth operation of trains over summits and across sags.

- D -

Derail
A track device to guide rolling stock off the rails at a selected spot and divert the rolling stock away from the track that is being protected. Derails provide protection against collisions or side swipes. Derails are generally of three kinds: the “split switch,” the “sliding block,” and the “hinged block” type.

Derailment
Anytime a wheel of a car or engine comes off the head of the rail.

Desired Rail Installation Temperature Range (DRTR)
The rail temperature range, within a specific geographical area, at which forces in CWR should not cause a buckling incident in extreme heat, or a pull apart during extreme cold weather. Definition from FRA Part 213, §213.119(g).

Deviation
Difference between a design or published standard and actual measurement at any one location.

Disturbed Track
The disturbance of the roadbed or ballast section, as a result of track maintenance or any other event, which reduces the lateral and longitudinal resistance of the track.

Dynamic Train Loading
Vertical, horizontal and longitudinal forces that are imparted to the track structure during the passing of a train due to wheel action and vehicle response.

- E -

Elastic Rail Fastener
A rail hold down system that secures the running rail to wood or concrete ties and/or a concrete slab. The fastener uses rail clips and a base plate with or without resilient pads. This system provides lateral, longitudinal and vertical rail restraint during the passage of trains. (See additional information under "Rail Fastening System.")

Engine Burn
Damage to the rail head metal caused by slipping or "spinning" powered wheels. Engine burn fracture is a rail break caused by an engine burn.

Expansion Joint
A device that allows thermal movement in rail to be relieved by allowing the rail on one side of the joint to freely expand and contract. Often installed on the approaches to moveable bridges so that thermal forces and movements in continuous welded rail adjacent to the bridge cannot be transferred into the bridge or the miter rail assembly, where it could jam and prevent needed movement.

- F -

Facing Point
A facing point move is one where the rail vehicle moves over the switch points and then the frog.

Federal Railroad Administration (FRA)
A government agency in the U.S. Department of Transportation.

Fishing Space
Space between the head and base of a rail occupied by a splice bar (angle bar, joint bar).

Flangeway
Measured space between running rail, guard rail, frog casting, frog wing rail and road crossing to provide clearance for passage of wheel flanges.

Flow of Metal (Rail)
Deformation of the top of the rail head on the crown of a rail toward the gage or field side. Common on the low side of a curve where trains run at less than balanced speed.

Fracture – Detail
A progressive transverse fracture originating in the head of a rail.

Frog
A device used where two running rails intersect, with flangeways to permit wheels and wheel flanges on either rail to cross one another.

Frog – 1/2" Point
The 1/2" point of frog is the point at which the spread between gage lines is 1/2". All measurements in the field are usually made from the 1/2" point of frog.

Frog – Railbound Manganese (RBM)
A frog assembly that consists of wing rails surrounding a manganese casting with a rigid frog point and flangeways. A conventional guard rail is used with this type of frog.

Frog – Self-Guarded (SGM)
A frog with a guard member for guiding the flange of a wheel past the point of frog by engaging the tread rim of the wheel in a horizontal plane above the top of the running surface of the frog. This makes a conventional guard rail unnecessary.

Frog – Spring
An appliance that contains, among other things, a fixed frog point, a moveable spring wing rail, a rigid wing rail, frog hold-down assemblies, and spring box. The frog makes use of a long guard rail (on the straight side). The spring frog design provides a continuous bearing surface for the wheel tread as it traverses through the frog point area on the straight side of the turnout.

Frog – Theoretical Point
The theoretical point of the intersection of the gage lines. The theoretical frog point is at a distance, in inches, ahead of the 1/2" point which is equal to one-half the frog number (i.e., number 10 frog is 5").

Frog – Throat of
Point at which the converging wings of a frog are closest together.

Frogs – End
The two frogs at the opposite ends of the long diagonal of a crossing or slip.

Frog Angle
Angle formed by intersecting gage lines of the rails in a frog.

Frog Number
The frog angle expressed as the number of units of centerline length in which the spread is one unit (i.e., 10:1 is a number 10 frog).

- G -

Gage Line
A line 5/8" below the running surface of a rail on the side of the head nearest the track center. The line from which measurements of gage are made.

Gage of Track
Distance between gage lines of rails laid in track.

Gage Rod
A device for holding track to correct gage, generally consisting of 1-1/4" rod with a forged jaw on one end and a malleable jaw on the other end, adjustable through a locknut. Sometimes consists of a rod made in two parts with a solid jaw on each end, united by a turnbuckle.

Gaging of Track
Bringing the rail heads of a track into their correct distance apart.

Grade
Rate of rise or fall of the grade line, expressed as a percentage of the feet of rise or fall per 100' of length. A steady rise or fall of 1' per 100' is a 1% grade.

Grade Line
The line representing top-of-rail elevations and the profile of the track.

Grade Rail
The rail first surfaced to track elevation; the line rail on tangents, the inner or low rail on curves.

Guard Rail - Frog
A rail section assembly used in a turnout with a railbound manganese (RBM) frog, spring rail frog, or in track crossings. The guard rail is designed to guide the wheel set through the proper flangeway of the frog. The guard rail prevents the wheel flange from wearing, striking or picking the frog point.

Guard Rail – Inner Track
An additional rail or rails laid parallel to and between the running rails of bridges, bridge approaches, and at other critical locations to prevent derailed equipment from striking a bridge or other structure and to keep the derailed wheels on the ties of the bridge.

Guard Rail – Outer Track
Additional timber laid parallel to the running rails of long-span viaducts.

- H -

Head Block - Switch
Ties used to support the switch-point operating mechanism (powered or unpowered) and the switch stand.

Head or No. 1 Rod
The switch rod nearest the point of a switch, usually placed between the two head block ties.

Heel Block - Fixed
A rigid heel block assembly at the switch heel to maintain the proper horizontal heel spread between the switch rail and stock rail. The heel block limits the amounts of longitudinal movement between the switch point and stock rail. The heel block is bolted to the switch rail and stock rail.

Heel Block - Floating
An assembly at the switch heel to maintain the proper horizontal heel spread between the switch rail and stock rail. If the assembly is bolted to the switch rail only, the switch heel “floats” and is called a floating heel block.

Heel Length - Frog
Distance between the heel end and half-inch point of a frog measured along gage lines.

Heel of Frog
The end of a frog farthest from the switch point.

Heel of Switch
The end of the switch where the switch point connects to the closure rails (see Heel Block – Fixed and Floating). The heel of the switch can be either fixed to the stock rail or allowed to float freely.

Heel Spread - Frog
Distance between gage lines at the heel end of a frog.

Heel Spread - Switch
The distance between the gage lines of the stock rail and switch rail at the heel of the switch.

Highway-Crossing Warning Devices (Active)
An arrangement of one or more highway-crossing signals, with or without gates at a highway grade crossing.

- I -

Interlockings
An arrangement of signals, switch locks, and signal appliances so interconnected that their movements succeed each other in a predetermined order. It may be operated manually or automatically.

- J -

Joint Bar
A steel angle bar or other shape used to fasten together the ends of rails in a track. They are used in pairs and are designed to fit the space between head and base of rail (fishing space) closely. They are held in place by track bolts. Also called angle bar, rail joint bar and splice bar.

Joint Bar – Compromise
A special rail joint, sometimes called a step joint, for joining rails of different sections. The joint is made so that it brings gage faces and rail heads into line so that a continuous smooth surface is present for the treads and flanges of passing wheels. The hand of a compromise joint is designated by standing in the gage of track at the small rail section looking or facing towards the heavier rail section to be joined or compromised. In this location in track, the right hand compromise joint is on the right and left hand is on the left. A compromise joint is described by indicating the heavier rail section and then the light rail section to be compromised (i.e., 136/115).

Joint – Frozen
A joint so tight that the rails cannot move within the joint bar as temperature varies.

Joint – Insulated
A rail joint designed to prevent the flow of electric current from rail to rail by means of insulation so placed as to separate the rail ends and other connecting metal parts at the joint.

Joints – Supported and Suspended
A supported rail joint has a tie directly under the rail ends. A suspended joint is one in which ends of the rail joint are not resting on a tie.

Joint Tie
A cross tie used under a rail joint.

- L -

Latch - Switch Stand
A device for catching and holding the lever of switch stand in position, also called a switch keeper. Two latches are used at each switch stand.

Lateral Acceleration
The horizontal acceleration experienced by a rail vehicle that is perpendicular to the direction of travel. Lateral acceleration is a measure of ride quality and measured in units of ft./sec^2(g).

Lateral Resistance
The ability of the track structure to remain in position under the influence of in-service forces that are generated in a plane perpendicular to the line of the rail. Lateral resistance is a product of interaction of the ballast with the sides, bottom and end face of the tie.

Lead (Conventional)
The length between the actual point of switch and the 1/2" point of frog, measured on the line of the straight track.

Lead – Theoretical (Tangential)
The length between the actual point of switch and the theoretical point of a moveable point frog, measured on the line of the straight track.

Level Board
A tool used to determine the cross-level or super elevation of a track.

Lift Rail
The portion of a miter rail assembly that is attached to the moveable span of a moveable bridge. Sometimes called the bridge rail or moveable rail.

Line
The condition of a track in regard to uniformity in direction over short distances on tangents or uniformity in variation in direction over short distances on curves.

Line Rail
The rail on which alignment is based; the east rail of tangent track running north and south, the north rail of tangent track running east and west, the outer rail on curves, or the outside rails in multiple track territory.

Lining Track
Shifting the track laterally to conform to an established alignment. Maintenance lining is ordinarily done during repairs. Lining is done to make the track conform to predetermined alignment.

Longitudinal Resistance
The ability of the track structure to remain in position under the influence of train and temperature forces that run parallel with the rail. Longitudinal resistance is a product of the interaction of the ballast, the tie, rail anchors, rail clips and other elastic fasteners.

L/V Ratio
The relationship of lateral force on the rail to the vertical force on the rail, which is produced by the wheel of railroad rolling stock, locomotives, work equipment and other equipment moving along the track.

- M -

Maximum Authorized Speed (MAS)
That maximum speed for a portion of track as specified in the current Employee's Timetable.

Mechanical Stabilization
A procedure used to restore lateral and longitudinal stability of disturbed track following maintenance operations. This procedure may incorporate dynamic track stabilizers which are units of work equipment that are used as a substitute for the action provided by the passage of tonnage trains.

Middle Ordinate
The distance measured from gage line of rail to the middle of a string drawn taut and held to contact with the gage line of rail at its end. The middle ordinate provides a means of measuring curvature. Can also be used in bending rails to a desired curvature.

Miter Rail
A rail assembly on a moveable bridge that spans the gap between the moveable span and the adjacent stationary portion of the bridge. The miter rail typically consists of two pieces. One rail is stationary or fixed and attached to the non-moving portion of the bridge and the second rail is attached to and moves with the moving portion of the bridge.

The term miter is used because typically the abutting ends of the two portions of the miter rail assembly, rather than being cut square as in a conventional rail joint, are cut at an acute angle or "mitered" relative to each other. The miter can provide the wheels with continuous support over the rail gap.

Because one rail must be able to move relative to the other when the bridge is being opened, the abutting ends of the miter rail assembly are not bolted to each other as in a conventional rail joint, but rather sit in bed plates that align one end of the miter rail relative to the other.

Moveable Bridge
Any bridge span over a navigable waterway that can be moved to accommodate the passage of vessels taller than the normal underclearance of the bridge.

- N -

Neutral Temperature
The temperature at which rail is secured in a stress-free condition.

Neutral Temperature Management (See Appendix A)
Maintaining the condition of the track structure so that the neutral temperature of the rail remains within the acceptable neutral temperature range.

Number - Turnout
The number corresponding to the number of the frog used in a turnout.

- O -

Out-of-Face Surfacing or Lining (See Appendix A)
The continuous surfacing and/or lining of a piece of track greater than 200' in length.

Out-of-Face Tie Renewal (See Appendix A)
Tie replacement at the rate of more than six (6) ties per 39' of rail. Not more than two (2) consecutive ties nor more than six (6) ties per 39' of rail can be replaced in any one pass.

Out-of-Face Undercutting (See Appendix A)
Undercutting of more than two (2) consecutive ties or more than six (6) ties in 39' of track.

- P -

Post – Bumping
A device at the end of stub track to prevent rolling stock from going off the ends of the rails.

Preferred Rail Laying Temperature (PRLT)
The desired temperature (i.e., 95ºF) at which continuous welded rail (CWR) is to be laid. The PRLT is region-specific and is the temperature at which there will be no stress in the CWR.

Profile
A longitudinal section through a track that shows elevation of the grade rails. The profile is usually obtained from levels taken on top of the rail.

- R -

Rail - High
The outer or elevated rail of a curved track, which is maintained as the line rail.

Rail - Low
The inner rail of a curve which is maintained as the grade rail.

Rail – Nervous Track
CWR which exhibits minute alignment irregularities which indicate that the rail is in a considerable amount of compression.

Rail - Scrap
Rails of standard section not fit for use as relayer rail.

Rail Anchors
Those devices which are attached to the base of the rail and bear against the side of the crosstie to control longitudinal rail movement. Certain types of rail fasteners also act as rail anchors and control longitudinal rail movement by exerting a downward clamping force on the upper surface of the rail base.

Rail Bender
A tool for bending stock rails.

Rail Bond
A device used to transfer an electric circuit across rail ends at a rail joint or discontinuity in the rail.

Rail Brace
A device used at switches, moveable-point frogs, guardrails, etc., in combination with switch, tie or gage plates, for holding rail in place in the plate and preventing lateral displacement.

Rail Brand
An identification mark, including manufacturer’s name or initials, month and year the rail was rolled, manufacturer’s identification label, weight per lineal yard, initials of section, number of the heat, portion of the ingot and process of manufacture.

Rail Fastening System
The hold-down appliances that provide the required combination of horizontal, lateral and vertical restraint to permit the safe operation of rail vehicles. Examples of conventional systems found include the cut spike and rail anchor. Examples of elastic fastening systems include the Pandrol “e” clip, fast clip with a pin (lock spike) or lag screw.

Rail Joint - Pumping
A poorly supported rail joint that has excessive up and down movement under the passage of trains.

Rail Section
The pattern of dimensional details of rail, such as width of base, height of rail, thickness of web, width and thickness of head, angle of head and angle of base. Each particular pattern is identified by a brand name or symbol, such as ASCE, AREA, ARA, PRR, PS, etc., in addition to its weight per yard.

Rail Stretcher Expander
A rail puller/expander operated by hand or by machine that is used to increase or decrease the gap between adjoining rail ends.

Rail Temperature
The temperature of the rail, measured with a rail thermometer on the shaded side of the web.

Rail Weight
The weight of a three (3) foot-long section of rail expressed in pounds per yard.

Relay Material
Useable secondhand rail, ties or other track material (OTM).

Roadbed
The finished sub-grade surface upon which the track and ballast rest.

Rod - Operating
A rod attached to a switch, derail, or other device, for moving it from one position to another. The operating or throw rod can be reset to adjust the amount of throw occurring at the switch.

Running Rail
The rail or surface on which the wheel bears.

Runoff - Curve
The change in superelevation in the spiral/easement from the full body of a curve to tangent or between compound curves.

Runoff - Surface
An area of grade change in track where the raised portion of a track is connected with the existing grade. The runoff between the two elevations is made along the two rails at a designated rate of change per 31' station for comfort and safety.

- S -

Scrap
Rail, ties or other track materials (OTM) that are not suitable for reuse.

Screw - Lag
A cylindrical threaded steel spike with a square head designed to be turned with a special appliance into holes bored into ties.

Shim - Track
A bearing piece, usually wood or metal of various thickness, at least equal to the width and length of the tie plate, for temporary use between the tie plate and ties to raise (surface) the rail to a desired relative elevation. Usually used to spot surface a track when the roadbed is frozen and the ties cannot be tamped and surfaced.

Side Planing - Undercutting
Cuts made on sides of the head of the switch rail to form a taper from the full width of the head to the switch point. Also used in a stock rail to match undercut switch points.

Spot Surfacing (See Appendix A)
Surfacing a piece of track up to 200' in length.

Spot Tie Renewal (See Appendix A)
The installation of six (6) or less ties per 39' of rail with no more than two adjacent ties replaced in a row. The new ties must be promptly tamped and the ballast properly dressed.

Stock Rail
The two running rails that support the operation of the switch points. The straight stock rail is on the straight side of a lateral turnout The bent stock rail or curved rail is on the diverging side of the turnout. The switch points fit securely against or are undercut into the stock rail to permit the transfer of wheel load from the stock rail to the switch point. An equilateral turnout has two straight stock rails.

Stock Rail Bend
The bend or set that must be given the stock rail to allow the switch point to follow the gage line through the turnout. Usually, the stock rail on the diverging side of a turnout is bent. The opposite stock rail is straight .

Stringlining
A method for determining the alignment of a curve, by measuring mid-ordinates to the outer rail with string and paddles.

Sub-ballast
Any approved granular material which is placed between the ballast and finished sub-grade of the roadbed, to provide distribution of the load to the roadbed, better drainage, and prevent upheaval of the sub-grade by frost.

Sub-grade
The top of natural materials, gravel or crushed rock, usually inferior to ballast or sub-ballast, placed in fills or at the bottom of cuts that lie directly below the sub-ballast and ballast.

Superelevation – Equilibrium
The elevation of the outer rail which balances the centrifugal forces while negotiating a curve at a given design speed.

Superelevation
The height at which the outer rail is raised above the inner or grade rail on curves to resist the centrifugal force of moving trains.

Switch
A connection between two lines of track to permit flange wheeled rail vehicles to pass from one track to another.

Switch – Insulated
A switch in which the fixtures, principally the gage plates and the switch rods connecting one rail to the other, are provided with insulation so that electric currents will not be shunted.

Switch – Spiked/Clamped
A switch point that is secured in one position through the use of spikes, blocks and clamps.

Switch – Throw of
The distance measured between the switch point and stock rail at the point of switch.

Switch Heater
A device for melting snow with heat generated by an electric current, gas or propane. This device enables a switch which is so equipped to be thrown in inclement weather when there are accumulations of sleet, ice or snow.

Switch Lock
A fastener, usually a spring padlock used to secure the switch or derail stand in place.

Switch Machine
The signal appliance that powers and provides for the positive movement and locking of the switch points and/or moveable point frog to permit the safe, uninterrupted movement of rail vehicles through a turnout.

Switch Machine Rod Basket
The appliance that connects the operating rod to the No. 1 tie rod in the switch or to the frog point lug of a moveable point frog

Switch Obstruction Test
This test is used as part of the criteria to determine if the switch points in signal territory are properly fitting up against the straight and bent stock rails or if the moveable point of a moveable point frog fits against the moveable point frog housing. This test ensures that the proper signal indication is being conveyed as the points move and are seated.

Switch Plate
A special metal tie plate for use on switch ties, each plate being long enough to extend not only under the stock rail and its supporting braces, but also under the switch point in the open position. Switch plates are furnished in sets to correspond with switch length. There are two plates to each tie. However, at the point of switch and at helper locations, the two plates may be replaced by a gage plate(s) that carries both switch points. A type of high-profile switch plate used in some turnouts which contain two elastic clips to secure the stock rail to the switch plate.

Switch Point
The moveable rail of a switch which determines the direction of train movement.

Switch Point – Undercut
A switch point that is planed on the field side to fit securely against an undercut stock rail.

Switch Point Guard
A structure made of rail or manganese steel secured to the field side of the running rail at the point of switch, with suitable flares to engage the tread rims of wheels and guide the wheel past the switch point. This appliance is intended to reduce or eliminate switch point contact and wear. This appliance is to be used where operating speeds are 15 mph and less.

Switch Point Lug (Clips)
The lug attached to a switch point, to which the front rod is connected.

Switch Point with Graduated Risers
A switch in which the switch points are gradually elevated by means of graduated riser plates, until they reach the required height above a stock rail and sloping back to zero at the fixed heel block.

Switch Point with Uniform Risers
A switch in which the switch points have a uniform elevation on riser plates for the entire length of the switch, and therefore do not have a heel slope. The switch point rail rise is run off in back of the floating heel block.

Switch Rod
The rods that connect the left hand and right hand switch point to ensure proper gage, alignment and adjustment throughout the switch.

Switch Stand
A manually operated device by which a switch is thrown, locked, and its position indicated. It consists essentially of a base, spindle, lever, connecting rod and target.

Switch Target
A signal placed adjacent to or fixed on the spindle of a switch stand with reflective materials indicating the position of the switch.

- T -

Tension
An axial force caused by equal and opposite forces pulling at the ends of the rail.

Thimble (Insulated Joints)
The cylindrical pieces of an insulating joint that surround portions of the bolts.

Throat of Frog
The point at which the converging wing rails of a frog are close together just ahead of frog point.

Tie
A transverse support to which rails are fastened to keep them in line, gage and grade. Usually wooden or concrete.

Tie - Centerbound
Ballast condition where an unusually large percentage of the wheel load is carried at the center of the tie. This is an undesirable situation as compacted ballast under the rail seats should carry the load.

Tie Plate
A metal plate at least 6" wide and long enough to provide a safe bearing area on the tie, with a shoulder to restrain lateral movements of the rail.

Tie Plate - Twin
A tie plate in two parts that mate to form a combined width equal to that of the stand tie plate, for use back of the heel of switch to the point where standard tie plates may be applied.

Tie Plug
A wooden plug driven in to fill an unused spike hole or lag hole in a tie, to exclude moisture, prevent decay, and provide solid wood for re-driving of the spike. Usually supplied in the form of sticks containing several plugs.

Tie Spacing
The distances between tie centers in track or turnouts.

Toe End of Frog
The end of a frog nearest the switch.

Toe Spread
The distance between gage lines at the toe end of the frog.

Track
The rail, ties, rail fastenings, hardware and roadbed between points not less than 4' outside of each rail.

Track Buckling
The sudden formation of large lateral misalignments caused by high compressive forces, in the presence of some other influencing factors.

Track Lateral Resistance
The resistance provided to the rail/crosstie structure against lateral displacement.

Track Longitudinal Resistance
The resistance provided by the rail anchors/rail fasteners and the ballast section to the rail/crosstie structure against longitudinal displacement.

Track - Skeletonized
Track with ballast removed from the cribs between ties.

Track Spike (Cut Spike)
A rectangular metal fastener with an elliptical head designed to secure tie plates and/or rail to wood ties and timber.

Track - Surface
The condition of the track structure as to vertical evenness or smoothness.

Tractive Force
The longitudinal force induced into the rail as a result of the tractive effort exerted by the powered axles of rail vehicles.

Trailing Point
A trailing point move would pass over the frog and then the switch points.

Train-induced Forces
The vertical, longitudinal and lateral dynamic forces which are generated during train movement.

Transition Rail
A rail that joins two rails of different sections. It consists of two different rails flash butt welded to a middle forged section of rail. This rail is used in place of compromise bars.

Transition Spiral
An easement curve from the tangent to the curve.

Transpose Rail
Changing rail from one side to the other on curves because of headwear.

Turnout (TO)
An arrangement of a switch and a frog with closure rails, by which rolling stock can be diverted from one track to another.

Turnout (Premium Design)
A turnout that contains premium materials such as fully heat treated rail with elastic fasteners on wood and/or concrete ties. The design of premium turnouts may incorporate such things as tangential geometry, asymmetrical switch points and moveable point frogs or spring frogs.

Turnout – Conventional
A turnout whose transition from tangent to curve is abrupt because of alignment changes between the switch point and frog. These turnouts are usually constructed on wood ties, but can also be constructed on concrete ties. These turnouts usually have a “tee” rail switch point section and a self-guarded manganese (SGM) frog or railbound manganese (RBM) frog.

- U -

Underbalance
The difference between the actual superelevation and the amount of superelevation calculated for equilibrium conditions. Design underbalance on the MassDOT operated railroads is 1-1/2".

- W -

Washer – Spring (Lock)
A spring tensioned member designed to prevent movement of a nut and the loosening of a bolted member due to wear, stretch or other deterioration.

Weld – Flash Butt
A butt weld joining two abutting rails. This weld serves to join the rail ends using only parent materials. Electric flash_butt rail welding is accomplished with a stationary or portable electrical plant.

Weld - Thermite
A weld joining two abutting rails. The weld serves to unite the abutting rails with the introduction of metal weldment into a preset gap. This is an alumnothermic process that is accomplished by using weld kits..

Wheel Tread
The flat or tapered surface of a railway wheel that contacts the top surface of the rail head.

Wing Rail
The left and right rails that are run from the toe to the flared end of a moveable point frog, railbound manganese frog (RBM) or spring frog.

Moving Massachusetts Forward.
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Rail & Transit

APPENDIX D

PLACEMENT OF TEMPORARY SPEED SIGNS

APPENDIX D

PLACEMENT OF TEMPORARY SPEED SIGNS

1.0 TEMPORARY SPEED RESTRICTION

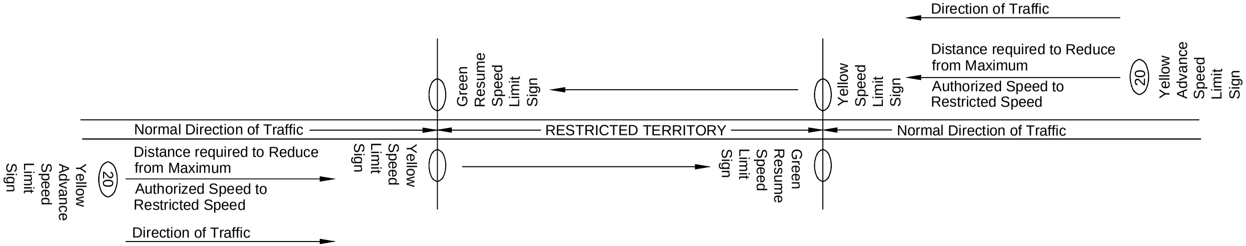
(a) Protection shall be provided for any track that is considered not satisfactory for the passage of trains at maximum authorized speed, including placing an appropriate temporary speed restriction and notification to the Train Dispatcher.

(b) Portions of Tracks, on which temporary speed restrictions have been placed, are to be marked by placing a reflectorized Advanced Speed Limit sign, and Speed Limit and Resume Speed signs to the right of each track for both directions of traffic.

- (1) The general arrangement, details of construction and assembly, height and distance from the track, of signs, shall be as shown on the following plans.
- (2) Signs are to be placed so as to give the greatest practical unobstructed view considering alignment and other local physical conditions. Reflecting surfaces of signs must be kept clean to preserve their reflecting ability.
- (3) Speed Limit and Resume Speed signs are to be placed with the Speed Limit sign at the point where the actual restriction begins and the Resume Speed sign at the point where it ends.
- (4) Advanced Speed Limit signs, with numerals indicating the speed restriction, are to be placed far enough ahead of the Speed Limit signs in the direction from which trains are approaching to permit trains to reduce from normal speed to the speed permitted by the restriction.

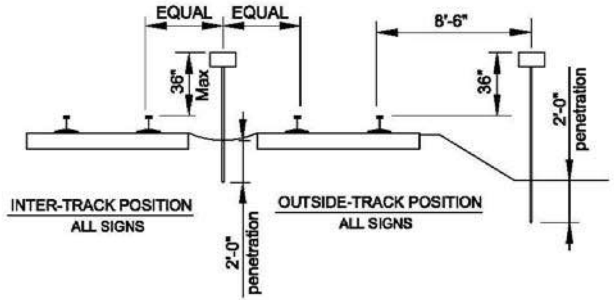
(c) When a condition arises requiring a speed restriction, the following must be done:

- (1) Notification must be given to the dispatcher governing movement on the track where restriction is required.
- (2) Notification must be given to Track Supervisor.
- (3) Notification must include:
  - (i) Limits of restriction by milepost station.
  - (ii) Speed to which track is restricted.
  - (iii) Reason for restriction.
  - (iv) Action being taken to correct condition.
- (4) Immediate action must be initiated to remove restriction.


Direction of Traffic
Distance required to Reduce from Maximum Authorized Speed to Restricted Speed
20
Yellow Advance Speed Limit Sign
Yellow Speed Limit Sign
Green Resume Speed Limit Sign
Normal Direction of Traffic
RESTRICTED TERRITORY
Normal Direction of Traffic
Yellow Advance Speed Limit Sign
20
Distance required to Reduce from Maximum Authorized Speed to Restricted Speed
Yellow Speed Limit Sign
Green Resume Speed Limit Sign
Direction of Traffic

LOCATION DIAGRAM FOR SPEED LIMIT SIGNS

SPEED LIMIT SIGNS
FOR
TEMPORARY SPEED RESTRICTIONS



SPEED LIMIT SIGNS
FOR
TEMPORARY SPEED RESTRICTIONS

Note:
Where local conditions make it desirable, the Resume Speed Sign and The Speed Limit Sign may be mounted back to back on the same support

Temporary Speed Limit Signs

Advance Speed Limit sign with numerals indicating restricted speed shall be placed a sufficient distance in advance of restricted territory to permit a train to reduce from maximum authorized speed to the restricted speed.

Speed Limit sign shall be placed to mark the entrance to the restricted territory.

Resume Speed sign shall be placed to mark the end of restricted territory. When entire train has passed this point, speed may be resumed.

Advance Speed Limit sign shall have background of Flat Top Yellow Scotchlite. Superimposed on the yellow background shall be 7" high x 11-1/2" wide black numerals showing speed permitted over restricted territory. Numerals shall be furnished in multiples of 10 miles per hour.

Speed Limit sign shall have background of Flat Top Yellow Scotchlite.

Resume Speed sign shall have background of Flat Top Green Scotchlite.

(d) Marking of Temporary Speed Restrictions:

  (1) Where it is anticipated that restriction will be of other than the most temporary nature, reflectorized slow boards will be used.

  (2) Information concerning slow orders:

    (i) Will be communicated to train and engine service personnel by train order or general notice.

    (ii) Limits of slow orders in train order or general notice must be consistent with placement of slow boards on the ground, and order must so state.

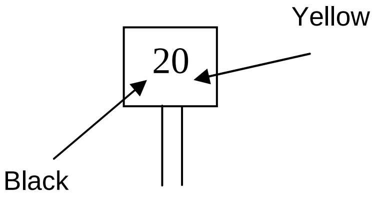
    (iii) Where slow order is of short duration and is issued on train order, slow boards need not be displayed.

  (3) Slow board placement:

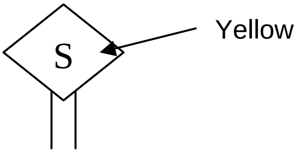
    (i) Slow boards will be of reflectorized material, clean and in good repair.

    (ii) They will be located to the right of and adjacent to the track protected, where they are unobstructed and can be clearly seen.

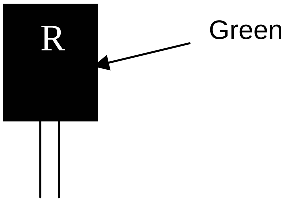
    (iii) Advance Speed Limit Sign – a yellow sign with the speed to which trains are restricted displayed thereon in black numerals will be placed ahead of the point of restriction to allow a train moving at maximum authorized speed to reduce to the restricted speed at the point of restriction.



    (iv) Yellow Speed Limit Sign – placed at the point at which restriction begins:



    (v) Green Resume Sign – placed at the point at which restriction ends:



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APPENDIX E

WEIGHTS AND MEASURES

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APPENDIX E

WEIGHTS AND MEASURES

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APPENDIX E

WEIGHTS AND MEASURES

The weights contained in these tables are for informational purposes only. Before moving and handling materials, the weights should be ascertained by contacting the appropriate manufacturer and/or supplier.

1. TIE PLATES

Tie Plate Description Conventional	Length of Plate	Width of Plate	Rail Base	Approximate Weight (lbs)
SSC(1)	10"	7-1/2"	4-7/16" to 5-1/8"	11.3
SSC	11"	7-1/2"	5-1/8" to 5-1/2"	13.1
DSC(2)	12"	7-3/4"	5-3/8"	16.2
DSC	11"	7-3/4"	5-1/2"	13.6
DSC	12"	7-3/4"	5-1/2"	16.2
DSC	13"	7-3/4"	5-1/2"	19.9
DSC	14"	7-3/4"	5-1/2"	23.3
Pandrol	15-1/8"	7-3/4"	5-1/2"	23.5
Pandrol	15-3/4"	7-3/4"	6"	24.5

Notes:
(1) Single Shoulder Canted
(2) Double Shoulder Canted

2. JOINT BARS(1)

Rail Section	Length of Bar	Approximate Weight Per Single Bar (lbs)
115/119 RE	36"	46.9
136 RE	36"	55.2

Note:
(1) If handling compromise bars, use the heavier rail weight section for the estimate of the bar weight.

3. BALLAST

	Average Weight Per Cubic Foot		**Average Weight Per Cubic Yard**	
Type of Ballast	**Loose (lbs)**	**Compacted (1bs)**	**Loose (1bs)**	**Compacted (lbs)**
Granite	88	98	2,375	2,650
Trap Rock	104	114	2,800	3,075

4. FASTENERS

Type	**Approximate Weight (lbs)**
Fast Clips (Bag of 50)	75
“e” Clips (Bag of 50)	88
Track Bolts (including Keg) (1" x 5-1/2")	210
Track Spikes (including Keg)	210
Lag Screws (Bag of 100)	110
115/119 RE Rail Anchors (Bag of 50)	125
136 RE Rail Anchors (Bag of 50)	150

5. TIES AND TIMBERS

Type	**Size**	**Approximate Weight (lbs)**
Wood Cross Tie Red or White Oak	7"x 9" x 8'-6"	246
Concrete Cross Tie	8'-6"	780
Concrete Switch Tie	9' to 16'	105 lbs/ linear foot
Wood Switch Timber (7"x 9" x Length) Total Tie Weight	9'	260
	10'	289
	11'	318
	12'	347
	13'	376
	14'	405
	15'	434
	16'	462
	21'	607
	22'	636

6.0 BONDED JOINTS AND RAILS

6.a BONDED INSULATED RAIL JOINTS

Rail Size	Rail Length	Approximate Total Weight (lbs)
115 RE	19'-6"	860
115 RE	26’	1,110
115 RE	39'	1,490
136 RE	19'-6"	995
136 RE	26'	1,290
136 RE	39'	1,880

6.b RAILS

Rail Size	Calculated Weight Per Yard (lbs)	Approximate Weight (lbs)
100 NH @ 33'	100.00	1,100
107 NH @ 39'	107.00	1,391
115 RE @ 39'	114.75	1,492
136 RE @ 39'	135.80	1,766

7.0 TURNOUT PANELS

7.a TURNOUT PANELS – Conventional No. 8 on Wood Ties

(136 RE)	Panel Length	Approximate Panel Weight (tons)
Nose Panel	39'	7.5
Frog Panel	39'	9.2

7.b TURNOUT PANELS – Conventional No. 10 on Wood Ties

(136 RE)	Panel Length	Approximate Panel Weight (tons)
Nose Panel	39'	7.5
Frog Panel	39'	10.8

7.c TURNOUT PANELS – Conventional No. 15 on Wood Ties (26' Curved Switch)

(136 RE)	Panel Length	Approximate Panel Weight (tons)
Nose Panel	66'	11.5
Frog Panel	52'	15.0

7.d TURNOUT PANELS – Conventional No. 20 on Wood Ties (39' Curved Switch)

(136 RE)	Panel Length	Approximate Panel Weight (tons)
Nose Panel	70'	14.0
Frog Panel	44'	13.9

8. HOOK FLANGE GUARD RAILS

Length (136 RE)	Approximate Weight	
	(lbs)	(tons)
9'	950	0.5
13'	1,350	0.8
20'	2,100	1.1
27'	2,800	1.5

9. RAILBOUND MANGANESE FROGS[1]

Turnout No.	Length	Approximate Weight	
		(lbs)	(tons)
8	18'	4,025	2.1
10	23'	5,025	2.6
15	26'-8"	5,625	2.9
20	34'-2"	6,925	3.5

Note:

[1] Approximate weights are for maintenance frogs with extended wing rails.

10. DIAMOND TRACK CROSSINGS

3 Rail	Approximate Weight	
	(lbs)	(tons)
High Angle Crossing (Ties Not Included)	14,000	7.0
Low Angle Crossing (Ties Not Included)	18,000	9.0

11a. AREMA SWITCH RAILS (115-119 RE)

Turnout No.	Stock Rail			Split Switch Point		
	Length	Approximate Weight		Length	Approximate Weight	
		(lbs)	(tons)		(lbs)	(tons)
10	27'-0"	1071	0.55	16'-6"	655	0.35
15	38'-0"	1,507	0.75	26'-0"	1,031	0.55
20	59'-6"	2,360	1.2	39'-0"	1,547	0.78

11b. AREMA SWITCH RAILS (136 RE)

Turnout No.	Stock Rail			Split Switch Point		
	Length	Approximate Weight		Length	Approximate Weight	
		(lbs)	(tons)		(lbs)	(tons)
10	27'-0"	1,223	0.62	16'-6"	748	0.38
15	38'-0"	1,721	0.87	26'-0"	1,177	0.59
20	59'-6"	2,695	1.35	39'-0"	1,767	0.89

12. WOOD-TIE TRACK PANELS

(136 RE)	Approximate Weight (tons)
39' Panel Length(1) (w/o 3rd rail ties)	4.5
39' Panel Length(1) (with 3rd rail ties)	4.6

Note:
(1) Pandrol plates 6" base and 21-1/4" tie spacing

13. HIGHWAY GRADE CROSSINGS – CONCRETE

Std. Track Panel(1) (lbs/track foot)	Crossing Track Panel(2,4) (lbs/track foot)	Concrete Gage Crossing Module(3,4) (lbs/track foot)	Concrete Field Modules(3,4) (lbs/track foot)
490.5	629.1	458	247

Notes:

(1) Concrete ties 8'6" long, spaced at 24" o.c. with Pandrol fasteners including galvanized e-clips, and 136 RE CWR.
(2) Concrete ties 10'0" long, spaced at 24" o.c. with Pandrol fasteners including galvanized e-clips and 136 RE CWR.
(3) Concrete crossing modules (available 8' or 12' lengths) for gage of track or field side.
(4) Total approximate weight per track foot is the crossing panel weight, the gage crossing module weight and two (2) times the field module weight.

14. HIGHWAY GRADE CROSSINGS – RUBBER

Shipping Weight Average per Skid (lbs)	Full Depth Heavy Duty Rubber Gage Crossing Pad(1,3) (each)	Full Depth Heavy Duty Rubber Field Crossing Pad(2,3) (each)
3,111	595	224

Notes:

(1) Rubber gage pad 3' length x 58-1/2" width x 8-1/4" depth for 136 RE rail.
(2) Rubber field pad 3' length x 22" width x 8-1/4" depth for 136 RE rail.
(3) Total approximate weight per track foot is the crossing panel weight, the gage crossing module weight and two (2) times the field module weight.

15. DECIMALS OF AN INCH

Fraction (inches)	Decimal (inches)
1/32	0.03125
1/16	0.06250
3/32	0.09375
1/8	0.12500
5/32	0.15625
3/16	0.18750
7/32	0.21875
1/4	0.25000
9/32	0.28125
5/16	0.31250
11/32	0.34375
3/8	0.37500
13/32	0.40625
7/16	0.43750
15/32	0.46875
1/2	0.50000
17/32	0.53125
9/16	0.56250
19/31	0.59375
5/8	0.62500
21/32	0.65625
11/16	0.68750
23/32	0.71875
3/4	0.75000
25/32	0.78125
13/16	0.81250
27/32	0.84375
7/8	0.87500
29/32	0.90625
15/16	0.93750
31/32	0.96875
1	1.00000

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APPENDIX F

FORMS

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APPENDIX F

FORMS

These forms are typical forms used in the inspection of maintenance of track and special track work by the MassDOT Rail and Transit Division.

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RAIL DEFECT INSPECTION REPORT

massDOT
Massachusetts Department of Transportation
Rail & Transit Division

Operating Railroad Name: ______________________________ Date of Inspection: __________

Detector Car Operator Name: ______________________________

Route Tested: ______________________ Track ________ MP ________ to MP ________

Inspection Company: ______________________ Track ________ MP ________ to MP ________

Detector Car #: ______________________ Track ________ MP ________ to MP ________

Detector Car Defect Number	Defect Type	Defect Size	Track Number	Mile Post	Immediate Corrective Action	Date	Final Corrective Action	Date

To be signed and submitted after all final active correction is complete:

*Operating Railroad Supervisor's Name: ______________________________ Date: ______________

*Operating Railroad Supervisor's Signature: ______________________________

*NOTE: Operating Railroad Supervisor is the Railroad Supervisor riding the detector car.

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SPECIAL TRACK INSPECTION REPORT

massDOT
Massachusetts Department of Transportation
Rail & Transit Division

Name of Operating Railroad:

Date Inspection Made: **Line Segment:**

Reason for Inspection: **Weather:** **Temperature:**

Location		Conditions Noted / Repairs Made
Track Name/No.	M.P. – M.P.	

Deficiencies/Defects Found	Corrective Action Taken

Operating Railroad Inspector's Name: (Print)

Operating Railroad Inspector's Signature:

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RAIL FAILURE REPORT

massDOT
Massachusetts Department of Transportation
Rail & Transit Division

Name of Operating Railroad:			
Date Discovered:		**Date Repaired:**	
Line Segment:	**MP:**	**Track:**	**Rail:** N / S / E / W
Defect Location:			
Rail: Tangent	**Curve:** High Rail	Low Rail	Degree of curve:
Notes:			
Special Work Type:	**MP:**	**Turnout Name:**	
Notes:			
Detector Car Defect: No Yes		**Defect No:**	
Type of Defect:		**Size of Defect:**	
Service Failure Defect: No Yes	**Type:**		**Found by:**
Type of Rail: Jointed CWR			
Rail Weight:	**Rail Section:**		**Manufacturer:**
Year Rolled:	**Month Rolled:**		
Type of Weld: Field Plant		**Joint Bars to Weld:** No Yes	
Rail Information:			
Temporary Speed Restriction (TSR): No Yes ____________________ MPH			
Defective Glued Plugged Rail: No Yes Length __________			
CWR Plug Rail Installed: No Yes Length __________			**Plug Rail Number:** _____ - _____ - _____
Boxed Anchored 200' from Joints: No Yes		**Form "TD" Required:** No Yes	
Rail Temperature when Anchoring:			
To be signed and submitted after all final active correction is complete:			
Operating Railroad Supervisor's Name: (Print)			
Operating Railroad Supervisor's Signature:			**Date:**

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CWR RAIL EXPANSION/HEAT RECORD REPORT

massDOT
Massachusetts Department of Transportation
Rail & Transit Division

Operating Railroad/Contractor:		**Weather:**
Line Segment:	**MP:**	**Track:**

Date	**Track Name/No.**	**Rail (N,S,E,W)**	**String Number**	**Start MP**	**End MP**	**Rail Temp. (°F)(1)**	**Req'd Temp. Change (°F) (2)**	**String Length (Feet)**	**Required Expansion (Inches) (3)**	**Installation Temp. Achieved (°F)**	**String Vibrated (Y/N)**	**Actual Expansion Recorded (Inches) Obtained at 1/4 Points(4)**			
												1/4	**1/2**	**3/4**	**Full**

Notes:
(1) Temperature to be measured with approved rail thermometer.
(2) Required temperature change in °F is preferred rail neutral temperature of 110°F (RNT) minus the actual rail temperature at the time of expansion.
(3) See formula and table on reverse side of form.
(4) After string is anchored and/or clipped.

Operating Railroad Foreman's Signature: ______________________________ **Date:** ______________

Operating Railroad Foreman's Name (Print): ______________________________

Formula for Coefficient of Linear Expansion of Rail:

$A = 0.000078 \times (T_D - T_E) \times L$

A = Adjustment or Required Expansion amount of rail string (in inches)
T_D = Desired Rail Neutral Temperature (RNT) should be 110°F if possible as conditions permit
T_E = Existing or Actual Rail Temperature (°F) prior to heating or expansion measured with an approved rail thermometer
L = Length of string to be adjusted (in feet)

Calculations:

Change in Rail Length Due to Change in Rail Temperature

A = Change in Rail Length in Inches = 0.000078ΔT x L
L = Length of Rail to be Expanded in Feet
ΔT = Change in Temperature in Degrees Fahrenheit: Desired RNT minus Actual Rail Temperature

Length of Rail (ft)	**Change in Temperature in Degrees Fahrenheit**															
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
	Change in Rail Length in Inches															
100	1/8	1/8	1/8	1/4	1/4	1/4	3/8	3/8	3/8	1/2	1/2	1/2	5/8	5/8	5/8	5/8
200	1/8	1/4	1/4	3/8	1/2	1/2	5/8	5/8	3/4	7/8	7/8	1	1-1/8	1-1/8	1-1/4	1-1/4
300	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2	1-5/8	1-3/4	1-7/8	1-7/8
400	1/4	3/8	1/2	5/8	7/8	1	1-1/8	1-1/4	1-1/2	1-5/8	1-3/4	1-7/8	2-1/8	2-1/4	2-3/8	2-1/2
500	1/4	1/2	5/8	7/8	1	1-1/4	1-3/8	1-5/8	1-7/8	2	2-1/4	2-3/8	2-5/8	2-3/4	3	3-1/8
600	1/4	1/2	3/4	1	1-1/4	1-1/2	1-3/4	1-7/8	2-1/8	2-3/8	2-5/8	2-7/8	3-1/8	3-3/8	3-5/8	3-3/4
700	3/8	5/8	7/8	1-1/8	1-3/8	1-3/4	2	2-1/4	2-1/2	2-3/4	3-1/8	3-3/8	3-5/8	3-7/8	4-1/8	4-3/8
800	3/8	5/8	1	1-1/4	1-5/8	1-7/8	2-1/4	2-1/2	2-7/8	3-1/8	3-1/2	3-3/4	4-1/8	4-3/8	4-3/4	5
900	3/8	3/4	1-1/8	1-1/2	1-7/8	2-1/8	2-1/2	2-7/8	3-1/4	3-5/8	3-7/8	4-1/4	4-5/8	5	5-3/8	5-5/8
1000	1/2	7/8	1-1/4	1-5/8	2	2-3/8	2-3/4	3-1/8	3-5/8	4	4-3/8	4-3/4	5-1/8	5-1/2	5-7/8	6-1/4
1100	1/2	7/8	1-3/8	1-3/4	2-1/4	2-5/8	3-1/8	3-1/2	3-7/8	4-3/8	4-3/4	5-1/4	5-5/8	6-1/8	6-1/2	6-7/8
1200	1/2	1	1-1/2	1-7/8	2-3/8	2-7/8	3-3/8	3-3/4	4-1/4	4-3/4	5-1/4	5-5/8	6-1/8	6-5/8	7-1/8	7-1/2
1300	5/8	1-1/8	1-5/8	2-1/8	2-5/8	3-1/8	3-5/8	4-1/8	4-5/8	5-1/8	5-5/8	6-1/8	6-5/8	7-1/8	7-5/8	8-1/8
1400	5/8	1-1/8	1-3/4	2-1/4	2-3/4	3-3/8	3-7/8	4-3/8	5	5-1/2	6-1/8	6-5/8	7-1/8	7-3/4	8-1/4	8-3/4
1440	5/8	1-1/8	1-3/4	2-1/4	2-7/8	3-3/8	4	4-1/2	5-1/8	5-5/8	6-1/4	6-3/4	7-3/8	7-7/8	8-1/2	9
1600	5/8	1-1/4	1-7/8	2-1/2	3-1/8	3-3/4	4-3/8	5	5-5/8	6-1/4	6-7/8	7-1/2	8-1/8	8-3/4	9-3/8	10

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FY 2022 & FY 2023 CAPITAL IMPROVEMENT PROGRAM

CAPE MAIN, MIDDLEBORO SUBDIVISION, FRAMINGHAM SECONDARY AND FALMOUTH LINE AT-GRADE CROSSING SURFACE REHABILITATION AND SIGNAL UPGRADE PROJECT

PROJECT SEQUENCE OF CONSTRUCTION

1	Union Road, Norton, Massachusetts	Middleboro Subdivision	Crossing 1-3 shall be completed first in this order. CSX runs 7 days a week.
2	Weir Street, Taunton, Massachusetts		
3	Hart Street, Taunton, Massachusetts		
4	Harvey Street, Taunton, Massachusetts		
5	South Crane Avenue, Taunton, Massachusetts		
6	Harrison Avenue, Taunton, Massachusetts		
7	Somerset Avenue, Taunton, Massachusetts		
8	Woodward Street, Norton, Massachusetts		
9	John Scott Boulevard, Norton, Massachusetts		
10	South Worcester Street, Norton, Massachusetts		
11	Elm Street, Foxborough, Massachusetts	Framingham Secondary	Can be completed at any time throughout the duration of the project. CSX runs 7 days a week.
12	Chestnut Street, Foxborough, Massachusetts		
13	South Street, Medfield, Massachusetts		
14	West Street, Medfield, Massachusetts		
15	North Main Street, Sherborn, Massachusetts		
16	Mary Dunn Road, Barnstable, Massachusetts	Cape Main Line (Public)	Will likely have to complete after Labor Day due to higher rail and vehicle traffic.
17	Marstons Lane, Barnstable, Massachusetts		
18	Bell Road, Bourne, Massachusetts	Falmouth Line	Will likely have to complete after Labor Day due to higher rail and vehicle traffic.

Note: All crossings will require coordination with local municipalities and MassDOT Highway for traffic detours / roadways closures with Mass Coastal RR for track outages. Contractor may request changes to the crossing construction sequence depending on availability of track and roadway closures.